DOCUMENT RESUME

ED 235 825 IR 050 483

AUTHOR Nour, Martyvonne Morton
TITLE Research in Librarianship: An Analysis of Research Articles in Core Library Journals of 1980.
PUB DATE Jul 83
NOTE 97p.; Master's Thesis, University of North Carolina at Chapel Hill.
PUB TYPE Dissertations/Theses - Master Theses (042)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS *Citations (References); Content Analysis; *Library Research; *Library Science; Library Surveys; *Periodicals; Records (Forms); *Research Methodology; State of the Art Reviews; Tables (Data)
IDENTIFIERS Journal Articles; *Library Science Literature; *Subject Analysis

ABSTRACT

A total of 343 research articles published in 41 core library journals in 1980 and a further 708 articles cited in a stratified random sample of 100 of the original (source) articles were examined in terms of subject, research methodology, and number of references. Findings were also compared with those of similar studies. It was found that: (1) library research literature is continuing to grow; (2) the most prominent research methodologies used in the source articles were surveys of libraries or the library public (41.5%), theoretical/analytical research (21.2%), and bibliometrics (10.9%); (3) the source articles were primarily distributed among six subjects, including administration (20.7%), library service (19.8%), materials (15.5%), automation (13.7%), technical processes (13.1%) and history (6.7%); (4) the average number of references per source article was 12.6; (5) over 80% of the research articles cited by the sample source articles were in the field of library/information science; (6) only 38.3% of the journal references made by the sample source articles were to journals outside the 41 core journals; and (7) over half (56.5%) of the cited articles were 5 years old or less. It was concluded that there is a developing body of library research literature that relies heavily on its own recent literature. (ESR)

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RESEARCH IN LIBRARIANSHIP: AN ANALYSIS OF RESEARCH ARTICLES IN CORE LIBRARY JOURNALS OF 1980

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by

Martyvonne Morton Nour

A master's paper submitted to the faculty of the School of Library Science of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Science in Library Science

Chapel Hill

July, 1983

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CONTENTS

Chapter

1. INTRODUCTION 1

2. REVIEW OF THE LITERATURE 3

   Research Methods in Librarianship 3
   Citation Analysis of Librarianship Literature 6
   The Relationship between Citing and Cited Documents . . 9

3. DEFINITIONS, METHODS AND PROCEDURES OF THE STUDY 12

   Identification of Core Library Journals 12
   Definition of Research and Designation of Source Articles 15
   Classification of Research Methodologies 16
   Classification of Subjects 17
   References 18
   Sampling Design 19
   Collecting the Data from the Sample Source Articles . . 22
   Data Analysis 26

4. THE SOURCE ARTICLES FROM THE CORE LIBRARY JOURNALS . . . 28

   Number of Research Articles in the Core Library Journals 28
   Research Methods of the Source Articles 30
   Subjects of the Source Articles 42
   References of the Source Articles 45

5. THE SAMPLE SOURCE ARTICLES AND THE ARTICLES THEY CITE . . 53

   The Sample Source Articles 53
   Research Methods of the Cited Articles 53
   Subjects of the Cited Articles 54
   Age of the Cited Articles 57
   The Referenced Journals 60
   The Relationships between the Sample Source Articles and the Articles They Cite 65

6. SUMMARY AND CONCLUSIONS 80

NOTES 84

REFERENCES 87

TABLES

3-1 Overlap of Index Coverage of Library and Information Science Journals during 1980 13

3-2 Core Journals Identified for Survey and Their Coverage by Library Literature, SSCI, LISA and the Peritz Study . . . 14

3-3 The Sample Frame and the Sample Stratified by Research Methodology of the Source Articles 23

3-4 Sample Members Replaced for Each Methodology 23

4-1 Proportion of Research Articles Published in the Core Library Journals of 1980 29

4-2 Research Articles in Core Library Journals, 1950-1980 . . . 31

4-3 Methodologies Used by 343 Source Articles from the Core Library Journals, 1980 32

4-4 Growth Indices for Main Methodologies Used in Research Articles from Core Library Journals 1950-1980 34

4-5 Methodologies of Source Articles from Core Library Journals by Total References of Article 35

4-6 Mean Number of References per Article in Each Methodology Category 37

4-7 Methodologies of Source Articles from Core Library Journals by References to Journal Articles 38

4-8 Methodologies of Source Articles from Core Library Journals by Subject of Article 39

4-9 Methodologies of Source Articles for Each Source Journal . . 41

4-10 Subject Distribution of the Source Articles in Core Library Journals of 1980 43

4-11 Source Articles in Core Library Journals of 1980 by Source Journal and Subject 44

4-12 Source Articles from Core Library Journals by Subject of Article and Total Number of References 46

4-13 Distribution of Source Articles from Core Library Journals of 1980 by Total Number of References and by Number of References to Journal Articles 47

4-14 Source Articles of Core Library Journals in 1980 by Source Journal and Total Number of References 49

4-15 Core Library Journals Ordered by Mean Number of References per Research Article in 1980 51

5-1 Distribution of Source Articles from the Core Library Journals of 1980 by Subject in the Sample and the Sampling Frame 53

5-2 Distribution of Research Articles Referenced by the 100 Sample Source Articles by Research Method Compared with the Distribution of Articles in the Sampling Frame by Research Method 55

5-3 Distribution of the Referenced Articles by Subject 56
5-4 Relative Distribution of Articles Referenced by 100 Sample Source Articles in Core Library Journals by Subject for Each Research Methodology 58
5-5 Age Distribution of Journal Articles Referenced by 100 Sample Source Articles in Core Library Journals of 1980 . 59
5-6 Mean and Median Age of Referenced Articles for Each Research Method 61
5-7 The Journals Referenced by 100 Sample Source Articles in Core Library Journals of 1980 62
5-8 Articles Referenced by 100 Sample Source Articles in Core Library Journals of 1980 by Referenced Journal and by Research Method 64
5-9 Sample Distribution of Referenced Articles by Research Method, for Five Research Methods of Source Articles . . . 67
5-10 Sample Distribution of Referenced Articles by Age, for Five Research Methods of Source Articles 69
5-11 Sample Distribution of Referenced Articles by Research Method, for Each Subject of the Source Articles 70
5-12 Sample Distribution of Referenced Articles by Subject, for Each Subject of Source Article 72
5-13 Sample Distribution of Referenced Articles by Subject (Library and Information Science or Other), for Each Subject of Source Article 74
5-14 Sample Distribution of Referenced Articles by Age for Each Subject of Source Article 75
5-15 Referenced Articles Cited by Each Source Journal, by Research Method 77
5-16 Journal Self-citation in the 100 Sample Source Articles from Core Library Journals of 1980 79

1. INTRODUCTION

Increasing attention is being directed toward research in librarianship. As the scientific-ness of the discipline is asserted, research publication is demanded and characteristics of library research are examined. As in other disciplines, the principal channel of published research in librarianship is the professional journal, though a great deal also rests in unpublished dissertations. Published and unpublished library research papers are frequently described in terms of content. Methodology also is an important element in the characterization of a literature's research but unfortunately few quantitative studies have been made of research methods used in librarianship.

Citation analysis frequently has been used to describe a discipline's literature, though citations are often analyzed only by their extrinsic elements. Because of the increasing use made of citation indexes, citations are studied in order to determine the relationship between citing and cited documents for the purpose of identifying indicators of relatedness which then may be included in such indexes. Studies of the functions of references have verified that a document's research methodology may be the reason for its being referred to or cited. No study has been made, however, of the relationship of the research methodology of a document to the research methodologies of the references it cites.

This study focusses on the research articles published in English in core library journals during 1980. (The 1975 study by Peritz[1] of research in librarianship is extended; consequently the study design and methodologies are similar.) The research articles and their references are described to complement our knowledge of the nature of research in librarianship. For a stratified random sample of these articles, the relationship of the articles to the journal articles they cited was investigated in an effort to explain the process of referencing. Citation analysis and content analysis were the methods used in the study.

2. REVIEW OF THE LITERATURE

Three separate areas of study are related to the present research: a) research methods used in librarianship, b) citation analysis of librarianship literature and c) the relationship between a source article and its references (i.e. the relationship between a citing article and the references it cites). Accordingly the following review of the literature is divided into three parts.

2.1 Research Methods in Librarianship

It has been the vogue for several years to criticize the nature of research in librarianship, which has been described as fragmentary, non-cumulative, non-quantitative, unsystematic and not generalizable. The general concensus is that too much of the research in librarianship is pragmatic; too little is being done to establish a theoretical structure for the discipline. The methods of the research are criticized as well. Most methodologies used in library research are borrowed from other disciplines; library research has not developed its own tools. Another general theme of the literature on research in librarianship is the concern for the lack of trained researchers in the field doing research; the bulk of library research rests in dissertations. Few quantitative analyses of research methods in librarianship are available to support or disclaim these assumptions.

To supplement their two volumes of annotated bibliographies of disserations on library-related subjects submitted during 1925-1972 and

1973-1981, Schlacter and Thomison[2] provide frequency counts of several dissertation variables (degree awarded, sex of author, institution, etc.) among which is research method used. During both time periods the ranking of methodologies used, from most-used to least-used, is the same: survey, historical, operations research, citation/content analysis, experimental, theoretical and other. Although the ranking remains the same over the two periods studied, the percentage distribution changes substantially for two of the methodologies used. While 30% of the dissertations from 1925 to 1972 used historical methods, only 15% of the dissertations from 1973 to 1981 used these methods. Survey research dissertations increased from 44% to 56% when the two periods are compared. Schlacter and Thomison note a trend toward more quantitative research: Only 16.8% of the dissertations completed from 1973 to 1981 are clearly nonquantitative in design or analysis, compared with 32% of the dissertations completed from 1925 to 1972.[3]

Kim and Kim[4] also noticed a trend toward increasing quantitative studies in librarianship. They performed content analysis on articles published in College and Research Libraries from 1957 to 1976. Author and methodology characteristics were compared for the two ten-year periods. Articles were classified as either quantitative or non-quantitative. Method of data collection for the quantitative articles was categorized as available data (secondary analysis), surveys and questionnaires, experiments, quasi-experiments or other. Study results indicated a remarkable rise in quantitative studies over time (15% in 1957-1966, 43% in 1967-1976) and a decrease in the use of survey methods to collect data (73% in 1957-1966, 62% in 1967-1976) although survey methods remained the most prevalent data collection method. Besides an

increase in experimental and quasi-experimental studies, Kim and Kim found an increase in the use of interviews. The later studies were more systematically designed and the data analysis was more sophisticated including more use of inferential statistics.

To investigate the nature of research methods used in librarianship, Grotzinger[5] quantified the methodologies of 76 dissertations written during 1977 and 1978 and sampled one or two years of five professional journals. Using methodology classes as defined by the investigators themselves, Grotzinger found that 42% of the dissertations relied on surveys, questionnaires or interviews; 17% on historical methods. As for the journal articles, she noted a difference in methodologies used depending on the source journal of the article. For example, 40% of the articles in College and Research Libraries were descriptive in method, compared with 77% of the articles from Journal of Education for Librarianship.

To compare the methods used in school library research to those of library research in general, Stroud[6] performed content analysis on 89 dissertations relevant to school librarianship listed in Dissertation Abstracts International during the years 1976 to 1981. More than half (56%) used survey methods, 15% content analysis, 8% historical and 6% experimental methods. Stroud concludes that

> doctoral research in the school library area has perhaps made slightly heavier use of descriptive-type studies and/or survey techniques, considerably less use of the historical approach, and approximately the same use of the experimental approach [than library science research in general]. Citation analysis and operations research, much in evidence in library research in general, has received very limited use in the school library area.[7]

Stroud also remarks that although many criticisms of library research remain valid, there is evidence that methodologies are maturing.

Peritz[8] surveyed 39 core journals of librarianship during five years from 1950 to 1975. An analysis of methods used was made for all the research articles (N=900) during the survey period. Peritz found that almost a third of the papers fell in the category "Surveys or experiments on libraries, services, operations, etc." The second most frequently used methodology was historical, at 18% of the papers. Growth indices were calculated for the major methodology categories against the base year of 1965. Most methodologies increased in use from 1950 to 1970. From 1970 to 1975 only three methodology groups showed an increase: surveys or experiments on libraries, theoretical and secondary analysis. Peritz offers an explanation for this trend in terms of the economy of the 1970s.

> It has probably become more difficult to implement new designs, while the need for the evaluation of the performance of existing systems has become even more urgent. Theoretical investigations and secondary analyses often deal with issues of economy and efficiency; they are also likely to be used more frequently when money for more expensive kinds of research is not available.[9]

In general the library research seems to be more process-oriented than client-oriented and more concerned with the needs of the professional community than with the needs of any other group.

2.2 Citation Analysis of Librarianship Literature

Although citation analyses have frequently been used to determine the characteristics of the literature cited by a particular discipline, librarianship literature has been the focus of only a few.

Brace[10] examined the references of 202 library and information science dissertations written from 1961 to 1970. No patterns were found to exist among the forms or topics of the references. No core literature or group of authors central to the field of librarianship

could be identified clearly. Brace concludes that these findings suggest that the theoretical base of librarianship is not universally recognized as a specific set of individual titles but may be weakly represented by a group of authors.

LaBorie and Halperin[11] recorded the school, subject and date of 186 doctoral dissertations in library science completed from 1969 to 1972. They took a sample of 2,139 references in order to characterize the literature cited by the dissertations. For each reference the following data were collected: form, date, language, place of publication, subject. Analysis of the subjects of the dissertations showed an emphasis on the practical operation of libraries: administration, services and materials. The subject distribution of the dissertations appeared to vary by school. For example, papers on automation were more likely to have been submitted to the University of Pittsburgh. Almost a quarter of the references were made to journal articles. A relationship appeared to exist between the subject of dissertation and the age of its references: history papers referred to older documents while automation papers referred to younger documents. References from the historical papers had other distinguishing characteristics as well; historical papers were more likely to cite foreign publications and foreign language materials. The authors conclude that the characteristics of library science literature closely resemble those of the social sciences.

The Peritz study mentioned in the introduction and in section 2.1 also includes a citation analysis of the core library journals over a 25-year period. Peritz found a high percentage of research papers in librarianship with no references, though the percentage decreased with

time. The median number of references per paper for the entire study period was five. The mean and median number of references steadily increased over the study period. For all years, 78% of the references were to the field of library and information science, implying very little interaction with other fields. Almost half of the references were made to journal articles.

Peritz also characterized the references by methodology of the survey research article. The mean and median number of references and percentage of papers without references varied by methodology and year.

> The theoretical papers have the highest median number of citations [references], a high mean, and the lowest percentage of papers without citations. 'Secondary analysis' papers tend to have high citation counts, since they have to contain references to their primary sources. The 'surveys or experiments' and 'information system design' papers (which include construction of classifications, thesauri, storage and retrieval systems, and other technical innovations) show the converse picture: low means and medians and a high percentage of papers without citations [references]. The surveys on the public and the bibliometric studies occupy an intermediate position; in the two smallest groups [comparative studies and other], the picture is consistent.[12]

Over time the differences among methodologies did not vary, and for all methodologies the percentage of papers without references decreased. The median number of references in the library research literature was found to be lower than the medians in other "comparable disciplines."

Only limited data on the ages of references were collected by Peritz but they suggest that the literature referred to by the library science research literature tends to be fairly recent. The percentage of references aged 7 years or more was consistently about 25% from 1960 to 1975.

2.3 The Relationship between Citing and Cited Documents

The literature of citation analysis is incredibly abundant and diverse. In this section of the literature review a few of the citation studies that research specifically the relationship between a document and its references, or the documents which cite it, are described.

Citation analyses almost always assume, among other things, that citations are equal and that the document cited is related in some manner to the citing document. Numerous studies have been undertaken to investigate the validity of these assumptions. The function of references and their "quality" (or nature) have been examined.

To understand more clearly the process of citing, Moravcsik and Murugesan,[13] Chubin and Moitra,[14] and Oppenheim and Renn[15] have researched the function of references in the physics literature. Frost[16] studied the function of references in literary research, and Spiegel-Rösing[17] investigated the function of references in social science. The results of these studies on the use of references show that, as has been assumed, there are many reasons for using references but, in addition, the results imply that references are not equal. Although the scales to measure the use of references vary among studies, there is evidence to support the assumption that a citing and cited document are related. Interestingly, methodology is a frequently-mentioned reason for citing a document.

In addition to differences by function, references may also differ by amount of information referred to and by content relevance to the source document. Bertram[18] studied the references from 50 articles in two 1966 science journals. She found that a statistically significant relationship does exist between the amount of information referred to and the position of the reference in the source article.

Voos and Dagaev[19] examined the articles that cited the four most-cited articles from 1970 to 1973. The citing articles were checked to determine the position in the text in which the reference to the cited article was made and how many times it was referred to (multiple mention). They found that position and multiple mention differed by discipline of the article cited and over time, from which it can be inferred that use of references may differ by discipline and over time.

From the 600 references analyzed from a physics journal, Murugesan and Moravcsik[20] also found that the use of references differs by discipline. An interesting result of this research is that 30% of the references were found to be redundant (no specific use was made of these references except to indicate that an author had dealt with the topic).

Other researchers have focussed their attention on the subject content of references to determine its relatedness to the subject of the source document. Barlup[21] asked a sample of authors of medical articles to evaluate the content relatedness to their own papers of those papers which cited them. She found that 72% of the citing papers were related to the source papers and that only 5% could be categorized as totally unrelated in content.

Herlach[22] performed a two-sample paired comparison to test the relationship between multiple mention of a reference within the same article as an indication of the subject relatedness of the reference to the source paper. Research papers which cited three science articles were divided according to single or multiple mention of the cited paper. "Blind" researchers judged the relatedness of the citing articles to the source articles. Herlach concludes that "on the basis of the statistical tests, multiple mention of a relevant reference within the

same research paper can be taken as an indicator of a close relationship between a given cited paper and the citing papers in which that reference is mentioned more than once."[23]

Bonzi[24] has attempted to identify other factors which may determine relatedness between a source article and its references. Her sample consisted of 482 references from 31 articles published in 19 library journals. The thirteen variables tested for significance in determining the relatedness of a reference are: source (magazine periodical in library science, research journal in library science, monographs in library science, etc.) and date of reference, author self-reference, journal self-reference, journal of source article (type of library, information science, research-oriented or non-research oriented journal), year of publication of source article, sex of authors, type of source article (historical, reviews of previous research, surveys, reports of existing systems and programs, and guidelines for future implementations), length, total number of references, number of references in the footnotes, multiple mention of references, and placement of the reference in the text. Through content analysis of the sample articles, she determined the subject relevance of the references on a four-point scale from "not specifically mentioned in the text" to "two or more questions or points discussed in text" (a scale which Bonzi characterizes as "not very reliable"). The relationship between four of the characteristics tested and the relatedness to the source article proved to be statistically significant: source of reference, type of journal in which source article is published, type of source article and multiple mention of references. The results of Bonzi's study tentatively identify several variables which could be used to indicate relevance between an article and its references or the documents which cite it.

3. DEFINITIONS, METHODS AND PROCEDURES OF THE STUDY

3.1 Identification of Core Library Journals

To characterize the library research of 1980 and to establish a sampling frame from which articles could be drawn for testing the relationship between articles and their references, the library journals of 1980 were surveyed. To restrict the study to a justifiably limited number of journals, 41 core library journals were identified. Although Line[25] has questioned whether a core list of journals is representative of all journals in a discipline, the defining of core lists is frequently attempted. (A feasible alternative for this study might have been to restrict the study to known research-oriented journals in librarianship.) Although a particular research journal (Library Research) was "missed" because of the rules specified for identifying core journals in this study, the broader range of journals surveyed affords a general characterization of library research within library literature as a whole, i.e., the description is not restricted to library literature from research journals only.

Several methods have been used to identify core journals of different literatures; two examples include use studies and citation studies. Peritz identified a core list of library journals by applying rules concerning the overlap in coverage of the journals in several bibliographical services of the field. The core journals of 1980 were identified in a similar manner for this study.

The lists of journals indexed during 1980 by Library Literature, Library and Information Science Abstracts (LISA) and Source Publications of the SSCI (Social Science Citation Index) were compared to determine overlap. In 1980 Library Literature and LISA indexed 218 and 106 journals respectively. Source Publications of the SSCI included 67 journals in library science and information science. The overlap of coverage of the journals during this period is shown in Table 3-1.

TABLE 3-1: Overlap of Index Coverage of Library and Information Science Journals during 1980

Combinations of Indexes	Number of Journals
LibLit & LISA	61
LibLit & SSCI	45
LISA & SSCI	29
LibLit, LISA & SSCI	29

Journals covered by at least two of the three bibliographical services checked for this study (excepting state and local journals, weeklies, annuals and foreign language journals) comprise the list of 41 core journals. In Table 3-2 the core journals are listed, the bibliographical services covering them during 1980 are indicated and whether or not the journal was included in Peritz's 1975 survey is shown.

All 1980 issues of each of the 41 core library journals were examined. (One issue was unavailable for study from Online Review, and one from Film Library Quarterly; no other issues were substituted.) In the event of issues which overlapped years, a commonsense decision was made about which issues to include, based on the publication frequency of the journal, volume number and/or binding characteristics.

TABLE 3-2: Core Journals Identified for Survey and Their Coverage by Library Literature, SSCI, LISA and the Peritz Study

Journal (Journal Abbreviation):	Lib.Lit.	SSCI	LISA	Peritz
1. American Archivist (Amer.Archivist)	X	X	0	X
2. American Libraries (Amer.Libs.)	X	0	X	X
3. Aslib Proceedings (Aslib Proc.)	X	X	X	X
4. Behavioral and Social Sciences Librarian (BSSL)	X	X	0	0
5. Canadian Library Journal (Can. LJ)	X	X	X	X
6. College and Research Libraries (CRL)	X	X	X	X
7. Drexel Library Quarterly (Drexel LQ)	X	X	X	X
8. Film Library Quarterly (Film LQ)	X	0	X	0
9. Government Publications Review (Govt.Pub.Rev.)	X	X	0	0
10. IFLA	X	X	0	X
11. Information Processing and Management (IPM)	X	X	X	X
12. International Library Review (Inter.Lib.Rev.)	X	X	X	X
13. Journal of Academic Librarianship (J of Acad.Lbnshp.)	X	X	X	X
14. Journal of Documentation (J of Doc.)	X	X	X	X
15. Journal of Education for Librarianship (J Educ.Lbnshp.)	X	X	X	X
16. Journal of Information Science (J Info.Science)	X	X	X	X
17. Journal of Librarianship (J Lbnshp.)	X	X	X	X
18. Journal of Library Automation (J Lib.Auto.)	X	X	X	X
19. Journal of Library History (J Lib.Hist.)	X	X	X	X
20. Journal of the American Society for Information Science (JASIS)	X	X	X	X
21. Law Library Journal (Law LJ)	X	X	X	X
22. Library Acquisitions (Lib.Acq.)	X	X	0	0
23. Library Association Record (Lib.Assoc.Rec.)	X	0	X	X
24. Library History (Lib.Hist.)	X	0	X	X
25. Library Journal (LJ)	X	X	X	X
26. Library Quarterly (LQ)	X	X	X	X
27. Library Resources and Technical Services (LRTS)	X	X	X	X
28. Library Technology Reports (Lib.Tech.Rep.)	X	0	0	0
29. Library Trends (Lib. Trends)	X	X	X	X
30. Libri	X	X	0	X
31. Medical Library Association, Bulletin (Med.Lib.Assoc.)	X	X	X	X
32. Online	X	X	0	0
33. Online Review (Online Rev.)	X	X	0	0
34. RQ	X	X	0	X
35. Scholarly Publishing (Schol.Pub.)	X	X	0	X
36. School Library Journal (School LJ)	X	0	X	0
37. School Media Quarterly (School Media Q)	X	0	X	X
38. Serials Librarian (Serials Lbn.)	X	X	X	0
39. Special libraries (Special Libs.)	X	X	X	X
40. UNESCO Journal of Information Science (UNESCO JIS)	X	X	X	X
41. Wilson Library Bulletin (Wilson Lib.Bul.)	X	X	X	X

3.2 Definition of Research and Designation of Source Articles

For each 1980 issue of the core library journals, the total number of substantive articles per journal issue were recorded. Not included in the count, for example, were book reviews, news items, correspondence or regular columns with nonprofessional content. Research articles were identified, by the definition below, and counted. Non-research articles, for example, were descriptions of libraries or services, case studies, essays or bibliographies.

Since this study attempts to supplement the Peritz studies, many of the definitions and procedures are similar. Peritz's conceptual definition of research was used: "Research is any inquiry which is carried out, at least to some degree, by a systematic method with the purpose of illiciting some new facts, concepts or ideas."[26] Peritz discusses the importance, but difficulty, of such a study definition. This definition was used to identify the research articles in the journals. No assumptions were made about:

"a) the generality of the conclusions of the study

"b) the adequacy of the methodology used

"c) the correctness of the results or conclusions

"d) the practical relevance of the conclusions to librarianship.[27]

For the data analysis all the research articles were treated as equal.

Two qualifications were specified for research articles counted in this study: length and originality. Peritz established a minimum length limit of two pages for research articles; this limit was considered unusable for this study since journals vary greatly in page and print size. Only "full-length" articles, judged in relation to other articles published in the same journal, were included.

Actually this restriction made very little impact; few research acticles were eliminated because they failed to meet the length requirement. Similarly few research articles were eliminated because they reported research that had been reported before in journal or book form and therefore lacked "originality."

The 343 full-length, original research articles identified from the 41 core library journals of 1980 were designated as the "source" articles for this study. For each source article the following data were recorded on photocopies of the tables of contents of the journal issues: journal, research methodology, subject, total number of references and references to journal articles.

3.3 Classification of Research Methodologies

Research methodology (or methodology or method) is the design of the systematic procedures and methods by means of which an inquiry is approached and carried out. The classification of research methodologies developed by Peritz was used in this study as well:

> 1. Theoretical/Analytic, including all the methodologies which are based on the marshalling of concepts rather than facts: mathematical modelling, semantic analysis, other linguistic analyses, philosophical constructs of various kinds, etc.
>
> 2. Information system design, including all the papers in which the design of some new and innovative procedure, technique or system is presented: new classification systems, the construction of new thesauri, new methods of organizing acquisitions, circulation, inter-library loans, new designs for data bases, inverted files and any other aspect of information storage and retrieval.
>
> 3. Surveys on the library public, including "user studies," studies on the public being served, studies of reading and other information gathering behavior.
>
> 4. Surveys or experiments on libraries, services, operations or persons. (The word "persons" refers to librarians and other people involved in providing the services or performing the operations, as opposed to users.)

5. Bibliometric and similar studies, including citation analysis.

6. Content analysis, including studies dealing with the contents or style in a given type of literature.

7. Secondary analysis, including studies that re-analyze published data from other studies, or from official statistics.

8. Historical methodologies, including all the techniques and methods associated with historical research.

9. Descriptive bibliography, including textual bibliography and criticism.

10. Comparative studies of regions or systems using methodologies other than the above. ("This category was created in order to accommodate a certain type of research in comparative librarianship which uses a combination of direct observation, interviews with librarians, secondary data analysis, and, occasionally brief surveys."[3])

11. Other and multiple.

The principal methodology of each research article was coded; additional methodologies were labelled if needed to describe adequately the particular study being examined. In 43 cases, two methodologies were assigned. Methodology category 11 (Other and multiple) was used for only two instances: one article that relied equally on four different research methods and one based on comprehensive system evaluation, employing several methods.

3.4 Classification of Subjects

A general classification of subjects in librarianship was used to describe the subjects of the source articles. The nine-point scale was adapted from the subject classification used by Laborie and Halperin[29] to describe doctoral dissertations in library science. The class "Information Science Theory" was added since many information science articles could not be classified into the other subject categories. The category "Unclassifiable" was created to accommodate library-related

articles which covered more than one of the subject classes. For example, a survey of the technical processes, materials and services of special libraries was assigned to "Unclassifiable." The subject classes for the source articles are:

1. Administration - studies on library finance, system analysis, salaries, librarians and professional education, ethics, buildings and architecture.

2. Library service - use of libraries, reference and research service, circulation and library cooperation, use of materials, bibliographic instruction.

3. Technical processes - acquisitions and cataloging, classification and indexing.

4. Materials - book selection, collection building, literary form and content, rare books, archives, serials, weeding, secondary services, citation analysis, non-print materials.

5. Automation - automation of library processes, computerized information retrieval, automatic indexing.

6. History - historical studies of libraries, library organizations and publishing, biography.

7. Information Science Theory.

8. Unclassifiable (library-related but not fitting into above classes).

9. Tangential to librarianship - publishing, bookselling, printing, etc.

3.5 References

The total number of references and the number of references made to journal articles were recorded for each source article. In this study a reference is the bibliographical note by which an author refers to a monograph, article, or other "item." (In other studies the references have frequently been called "citations" or even "cited sources.") The list of references, end notes, bibliography following an article, or its footnotes were examined to determine the number of

references. In the event of no such lists or footnotes, the source article was marked as having no references (internal references were not counted). Three conditions were specified in the count of references.

1) Only external references were counted, i.e., references in footnotes or bibliographies; references in the text were not counted.

2) Only bibliographical references were counted. Not included in the count of references were interviews, memos, or telephone conversations.

3) Only unique references were counted; multiple mentions of any one source were ignored. Ibids and Op. Cits. are examples of non-unique references. In the articles with footnotes and a bibliography or list of references, only the bibliography or list of references was checked.

Archives, manuscripts, newspaper articles, theses, dissertations, unpublished materials, articles from edited monographs and proceedings (unless a serial publication) were included in the count of non-journal references. The only references examined in this study were the references to journal articles made by the sample source articles.

The components of a reference are difficult to name. The referenced or cited article is the article indicated by the reference. The referenced or cited journal is the journal of the referenced article. The use of the terms for source articles and their references in this study is illustrated in Figure 1.

3.6 The Sampling Design

To test for a relationship between the source articles and the articles they referenced, it was necessary to collect data from each

FIGURE 1: Terms Used in Study

Variation of the Nature of Citation Measures with Journals and Scientific Specialties*

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The classification of scientific citations according to their quality and function, established in a previous paper, is strengthened by tests of its reproducibility and universality. The method is then applied to articles in various specialties of theoretical physics published in various journals, and conclusions are drawn about differences by specialty and by geographical areas. Specifically, it is shown for the sample investigated (a) that the number of papers referred to per article is much lower for Soviet journals than for European, US, or Japanese journals; (b) that this number is much lower for solid state physics than for high energy or nuclear physics; (c) that US journals have a higher percentage of conceptual citations, and a much higher percentage of organic citations than Soviet journals; (d) that the *Soviet Journal of Nuclear Physics* has citation patterns markedly different than the other two Soviet journals investigated and is rather similar to that of the US journals; (e) that high energy physics shows a significantly higher percentage of organic citations and a somewhat higher percentage o[f] ew[ ] physics or solid s[tate] sented to "explain

Title of Source Article (or Citing Article)

References
References to: Referenced or Cited Article & Referenced or Cited Journal

Source Journal (Journal of Source Article)

I. Introduction

In a previous p[aper] classifying citatio[ns] dichotomous parti[tion] in the conte[xt] such a classificatio[n] [as well as some background for] previous work on citations, was given there and will not be repeated here. It should suffice to say that the use of only the total number of citations as measures or indicators of scientific output is sufficiently crude so as to necessitate research on refinements of such measures which take into account the quality and context of such citations beyond mere numbers.

In the present paper the aim will be threefold. First, we want to present further results pertaining to the reproducibility and universality of the classification system we use. This will

classifications to explore possible diffe[rences] ogy of the scientific communities of d[ifferent] world as reflected in differences in ci[tation] results of this are described in Sec. IV. investigate if there are differences in [citation] among the various areas of scientific [research] pertaining to this question are given in [Sec.]

II. Reproducibility and Universality

Since our classification involves per[sons] cerning the role of the citation in a gi[ven] portant to establish that, nevertheles[s] procedure can be repeated by the same [person] times with substantially identical resu[lts] and that different classifiers will judge [citations] in a substantially identical way [for] [the monitoring of]

References

1. Moravcsik, M.J.; Murugesan, Poovanalingam. "Some Results on the Function and Quality of Citations." *Science Studies*. 5:86, 1975.
2. Chubin, D.E.; Moitra, S. "Content Analysis of References: Adjunct or Alternative to Citation Counting?" *Social Studies of Science* 5:423; 1975.

in this respect. First, as a result of in[teractions] classifiers and also of our own analysis [of data] have come to modify one of the fou[r] classifications, namely the conceptua[l-operational] distinction. In particular, previously [we] ence to a concept as conceptual, wher[ever] fication a citation is judged conceptua[l] a concept in the referring paper. As a change of definition, results of our fir[st] to the conceptual versus operational [dichotomy] should not be compared with results [in the] present paper.

In connection with this change [we] found useful to spell out in greater de[tail] all four dichotomies used in our clas[sification] the definition of the redundant cit[ation] definitions are now as follows.

*Work support[ed] Throughout t[he] sciences.

1978 by John Wiley & Sons, Inc.

of the articles referenced by the source articles. Since the 343 source articles surveyed in this study have a total of approximately 1900 references to journal articles, it was necessary to limit the study to the references from a sample of source articles.

Of the 343 source articles, the few (20) concerned with subjects tangential to librarianship were deleted. Also eliminated from the sampling frame were all 77 source articles with no references to journal articles and the 30 articles with only one reference to a journal article. This procedure guaranteed the presence of adequate data for analysis. It was decided that a stratified random sample would be drawn only from the first five methodology classes, because these classes include over 80% of the source articles (see section 4.2) and were presumed to be the most likely classes to yield significant results. The sampling frame was therefore composed of 188 of the source articles with approximately 1300 references to journal articles.

To enhance the representativeness of the sample, further stratifications of the source articles within each methodology of the sampling frame were considered. It was decided that the number of references to journal articles was the only other variable likely to affect the results of the investigation into the relationship between a source article and its references. Therefore, within each methodology stratum of the sampling frame, the distribution of source articles by number of references to journal articles was determined. The median number of references to journal articles was identified for each methodology stratum. The sample taken from each methodology class was equally divided between source articles with high and with low numbers of references to journal articles.

Since the methodology class "Surveys on the Library Public" included only eight articles in the frame, all eight articles were included in the sample. A simple random sample of 50% (rounded to the nearest whole number) was taken from each of the remaining methodology classes of the sampling frame subject only to the restriction discussed above on the number of references to journal articles. A table of random numbers was used to identify which specific members of the sampling frame should be included in the sample. These procedures led to the sample of 100 articles, which represents 53% of the sampling frame. The sample source articles contain 708 references to journal articles. The size of the sample taken from each methodology class and the number of references to journal articles from the sample articles are given in Table 3-3.

A guideline for sample replacement was also specified: Any source article for which fewer than 80% of the references could be examined for any reasons should be replaced by another randomly chosen member from the same stratum (methodology class and high or low number of references to journal articles). The number of sample members replaced for each methodology class are given in Table 3-4. The ten source articles which had to be replaced in the sample each contained so many references to foreign, state and/or local journals that fewer than 80% of the references were available for examination.

3.7 Collecting the Data from the Sample Source Articles

After the stratified random sample had been selected and the sample source articles identified, the previously collected data for source articles were recorded on a data collection form (see p. 24) for each article in the sample. These data included the bibliographic

TABLE 3-3: The Sample Frame and the Sample Stratified by Research Methodology of the Source Articles

Methodology of Source Article	Size of Sample Frame	Size of Sample	No. of Refs. to Journal Articles
Theoretical/Analytic	61	31	249
Info. System Design	19	10	69
Surveys on Lib. Public	8	8	54
Surveys or Experiments on Libraries	77	39	252
Bibliometrics	23	12	84
TOTAL	188	100	708

TABLE 3-4: Sample Members Replaced for Each Methodology

Methodology of Source Article	Number of Articles Replaced
Theoretical/Analytic	3
Info. System Design	3
Surveys on Lib. Public	0
Surveys or Experiments on Libraries	4
Bibliometrics	0
TOTAL	10

RESEARCH IN LIBRARIANSHIP: AN ANALYSIS OF RESEARCH ARTICLES IN CORE LIBRARY JOURNALS OF 1980

DATA COLLECTION FORM

Source Article_____

_____

_____

Subject_____Research Method_____Number of References_____

References to Journal Articles:

Citation	Subject	Research Method

record, research method, subject, number of references and number of references to journal articles for each sample source article.

The citations (bibliographic records) of the journal articles referenced by each sample source article were written on the data collection form. Data collected for each referenced journal article included: referenced journal, date, subject and research method. The referenced journal was coded as one of the 41 core library journals or "other." The date of the references was used in data analysis to compute the age of the references.

Each of the referenced articles was examined; no assumptions about its subject or research method were made from its title or the journal carrying it. Referenced articles which could not be obtained from local libraries or through interlibrary loan were coded as missing (This applied to only 14, or 2%, of the 708 references).

The subject and research method were recorded for each referenced article identified as research, using the same definition applied to source articles (see section 3.2). The subject of the article was classified based on the scheme Peritz used to describe the subjects of referenced works:

1. Library and information sciences.
2. Printing, publishing, book production.
3. Philosophy, linguistics.
4. Education, including reading.
5. Psychology, sociology, social and cultural anthropology, communication.
6. Management, business administration, economics, policy and administration, operations research, manpower studies, budget analysis, etc.

7. History and political sciences.

8. Life sciences, physical sciences.

9. Computer sciences, electrical engineering.

10. Mathematics, statistics.

11. Other and unclassifiable.[30]

In a pretest the classification scheme for research methods that was used to classify the source articles from the core library journals (see section 3.3) was tested for its appropriateness in classifying the research methods of the referenced articles. The scheme is specific to the field of librarianship but since so many of the referenced articles are also from the library literature, too much information would have been lost had the classification scheme been collapsed into a few more general classes. Classifying the research methodologies of referenced articles from subjects outside librarianship presented no problems; they fit easily into the classification. Consequently the classification scheme for research methodology described in section 3.3 was used to code the research methods of the referenced articles with only one alteration. The class "Surveys or Experiments on Libraries" was broadened to include all types of surveys and experiments; "Surveys on the Library Public" was retained as a separate class.

3.8 Data Analysis

The SAS (Statistical Analysis System, Cary, N.C.) was used to manipulate the data collected in the study to obtain frequency distributions and simple descriptive statistics. Two separate data files were created: one for source articles and another for articles cited by the sample source articles. In the first file every instance of the use of each research methodology was included so that the file contained

386 observations: 343 articles, 43 of which had a second methodology. Each entry included the research methodology, subject, number of total references and number of journal references for the source article. (The second entries for the 43 articles were tagged so that they could be eliminated easily from certain analyses.)

In the second data file the data for each of the 708 referenced articles was linked to the data for its source article. Each of the 708 observations included the referenced journal, date of reference, subject and research method of the referenced article and the source article's journal, subject and research method. Fifteen of the sample source articles had two research methods associated with them; 35 of the referenced articles had two methodologies. Each sample source article and referenced article was restricted to one methodology for data analysis. To make the choice between two methodologies, a "matching" rule was applied. For example, if the sample source article used methods 1 and 5 and one of the articles it cited used method 1, both the sample source article and the referenced article were recorded as using method 1 for that observation. This was an arbitrary decision not expected to affect the results of the study significantly since less than 5% of the referenced articles presented this choice.

4. THE SOURCE ARTICLES FROM THE CORE LIBRARY JOURNALS

This description of the source articles from the core journals is divided into four sections: number of research articles in the journals and the research methods, subjects and references of the source articles.

4.1 Number of Research Articles in the Core Library Journals

Table 4-1 gives the number of research articles published by the core library journals during 1980. Of the 1,404 articles surveyed, 24.4% (343) are classified as research articles as per the definitions and restrictions delineated in section 3.2. For half (20) of the library journals surveyed, the proportion of research articles to total articles is less than 25%. The five journals containing more than 50% research articles are: Journal of Documentation (60.0%), Journal of Education for Librarianship (56.0%), College and Research Libraries (54.5%), Library Technology Reports (53.3%) and Journal of the American Society for Information Science (51.9%).

Since only one year of these journals, 1980, was examined, care must be taken not to generalize the results of Table 4-1 to other years. Changes in editorial policies, etc. may affect significantly the content of the journals.

On the other hand, after recognizing the inherent limitations, it is informative to compare these results on the quantity of research literature in librarianship with the findings of other researchers. In

TABLE 4-1: Proportion of Research Articles Published in the Core Library Journals of 1980

Journal:	Issues	Total Articles	Total Research Articles	% of Articles Research
1. Amer.Archivist	4	29	11	37.9%
2. Amer.Libs.	11	25	1	4.0
3. Aslib Proc.	11	67	16	23.9
4. BSSL	4	18	6	33.3
5. Can. LJ	6	59	4	6.8
6. CRL	6	33	18	54.5
7. Drexel LQ	4	31	2	6.5
8. Film LQ	4*	9	1	11.1
9. Govt.Pub.Rev.(Part A) (Part B)	6) 4)	68	6	8.8
10. IFLA	4	28	1	3.6
11. IPM	6	27	13	48.1
12. Inter.Lib.Rev.	4	42	7	16.7
13. J of Acad.Lbnshp.	6	30	14	46.7
14. J of Doc.	4	15	9	60.0
15. J Educ.Lbnshp.	4	25	14	56.0
16. J Info.Science	7	43	21	48.8
17. J Lbnshp.	4	17	8	47.1
18. J Lib.Auto.	4	30	0	0
19. J Lib.Hist.	4	20	8	40.0
20. JASIS	6	54	28	51.9
21. Law LJ	4	45	14	31.1
22. Lib.Acq.	4	35	7	20.0
23. Lib.Assoc.Rec.	12	69	4	5.8
24. Lib.Hist.	2	3	0	0
25. LJ	22	85	8	9.4
26. LQ	4	23	9	39.1
27. LRTS	4	41	16	39.0
28. Lib.Tech.Rep.	6	15	8	53.3
29. Lib. Trends	4	47	13	27.7
30. Libri	4	19	6	31.6
31. Med.Lib.Assoc.	4	41	16	39.0
32. Online	4	23	2	8.7
33. Online Rev.	4*	20	6	30.0
34. RQ	4	31	8	25.8
35. Schol.Pub.	4	31	7	22.6
36. School LJ	10	40	5	12.5
37. School Media Q	4	13	1	7.7
38. Serials Lbn.	4	40	4	10.0
39. Special Libs.	12	47	16	34.0
40. UNESCO JIS	4	30	5	16.7
41. Wilson Lib.Bul.	10	36	0	0
TOTAL		1,404	343	24.4%

*Only three issues were examined.

Table 4-2 the data collected for 1980 are compared with Peritz's data for the years 1950 through 1975. This comparison suggests that although the number of research articles is still increasing, the proportion of research articles has declined dramatically since the 1975 high. This difference may be a reflection of changes in editorial policies, increased emphasis on publishing by professionals (which is not required to be research), the different journals included in the two studies, a stricter interpretation of "research," etc.

4.2 Research Methods of the Source Articles

In Table 4-3 the distribution of research methods used by the source articles is shown. (N=386, where the observations are the methodologies of the 343 research articles, 43 of which relied equally on two methods of data collection and were counted twice.) The largest category, containing more than a third of the articles, is, not surprisingly, made up of surveys and experiments on libraries. Over 40% of the articles are included when the two survey-methods categories are combined. The second most frequently used methodology during 1980 is surprising: theoretical/analytic; the third is bibliometrics.

These results are compared in Table 4-3 with the percentage distribution of methods used by articles surveyed by Peritz. (Peritz's figures for "after exclusions" are used for comparison here since the journals which Peritz identified as uncharacteristic of the library literature in general were not included in the present study.) It appears that the use of theoretical/analytic and bibliometric methods have dramatically increased from 1975 to 1980 while the use of system design and historical methods has decreased significantly. If the use of the different methodologies is ranked for each of the years 1975 and

TABLE 4-2: Research Articles in the Core Library Journals, 1950-1980*

Year	1950	1960	1965	1970	1975	1980
Number	76	96	139	274	315	343
% of Total Articles	8%	11%	15%	30%	35%	24%

*1950-1975 data from Bluma Cheila Peritz, "Research in Library Science as Reflected in the Core Journals of the Profession: A Quantitative Analysis (1950-1975)," (Ph.D. dissertation, University of California, Berkeley, 1977), p. 77.

TABLE 4-3: Methodologies Used by 343 Source Articles from the Core Library Journals, 1980

Methodology:	Number of Uses	As % of All Uses	% of Uses 1975*
Theoretical/Analytic	82	21.2%	14.0%
Information System Design	30	7.8	17.0
Surveys on the Library Public	22	5.7	6.0
Surveys or Experiments on Libraries	138	35.8	32.0
Bibliometrics	42	10.9	4.0
Content Analysis	11	2.9	1.0
Secondary Analysis	27	7.0	8.0
Historical	28	7.3	18.0
Descriptive Bibliography	1	.3	3.0
Comparative	3	.8	2.0
Other	2	.5	3.0
TOTAL USES	386	100%	100%

*Peritz, "Research in Library Science," p. 79.

1980 for comparison, the changes are most noticeable for the use of bibliometrics and historical methods. Bibliometrics, in a ranked order of methodologies used, moved from seventh place in 1975 to third place in 1980. The use of historical methods fell from second place in 1975 to fifth place in 1980.

Peritz figured growth indices for the main research methodologies from 1950 to 1975 using 1965 as a base year. In Table 4-4 the figures from 1980 have been added to show the most recent growth. Peritz's data indicate an increase in output from 1970 to 1975 for four methodology groups: theoretical/analytic, surveys or experiments on libraries, bibiliometrics and secondary analysis. Of these four groups only secondary analysis failed to show growth from 1975 to 1980. The methodology of surveys on the library public, which showed a decline in 1975, rose in 1980.

The general trend noticed from the data of the present study -- a rise in the use of survey methods and a decline in the use of historical methods -- is that noted by Schlacter and Thomison[31] who compared library dissertations for two periods, 1925-1972 and 1973-1981.

The categories of research methodologies were crossclassified with other article variables to discern patterns of heterogeneity among the methodologies. In Table 4-5 the distribution of articles within each methodology by the number of total references per article is shown. Of the 57 articles having no references, 34 (59.7%) are categorized as surveys or experiments on libraries. For articles using the method of surveys or experiments on libraries, almost 25% have no references. Over half (57.1%) of the articles using historical methods have 30 or more references; 78.6% of the articles using historical methods have 18 or more references.

TABLE 4-4: Growth Indices for Main Methodologies Used in Research Articles from Core Library Journals 1950 - 1980 (1965=100)*

Methodology:	1950	1960	1965	1970	1975	1980
Theoretical/Analytic	100	155	100	327	473	745
Information System Design	33	76	100	271	233	143
Surveys on the Library Public	33	22	100	222	211	244
Surveys or Experiments on Libraries	49	33	100	198	251	307
Bibliometrics	--	--	100	200	229	600
Secondary Analysis	40	100	100	87	180	180
Historical Methods	84	104	100	196	168	112
RESEARCH ARTICLES	55	69	100	197	227	278

*Data for 1950 - 1975 from Peritz, "Research in Library Science," p. 82.

TABLE 4-5: Methodologies of Source Articles from Core Library Journals by Total References of Article

Methodology:	Number of References													TOTAL
	0	1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-29	30+	
Theoretical/Analytic	8	2	5	6	8	6	8	2	4	3	8	12	10	82
Information System Design	3	2	3	3	2	1	3	3	1	3	1	3	2	30
Surveys on the Library Public	3	1	1	4	3	3	0	1	1	2	0	3	0	22
Surveys or Experiments on Libraries	34	4	15	11	12	9	5	12	7	5	6	14	4	138
Bibliometrics	4	3	4	4	6	4	6	2	4	1.	1	3	0	42
Content Analysis	2	0	3	0	2	1	1	0	1	0	0	0	1	11
Secondary Analysis	1	0	2	4	2	0	3	5	1	1	0	5	3	27
Historical	2	0	0	1	0	1	0	2	0	0	3	3	16	28
Descriptive Bibliography	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Comparative	0	0	0	0	0	0	1	1	0	0	0	1	0	3
Other	0	0	1	0	0	0	0	1	0	0	0	0	0	2
TOTAL	57	12	34	33	35	25	27	30	19	15	19	44	36	386

35

Another interesting perspective on this relationship between research method used and the article's total number of references is given in Table 4-6 where the mean number of references per article in each methodology category is computed. The research articles using historical methods have a mean of 35.6 references, clearly the highest for all research methods. Articles using bibliometrics and the two survey methodologies have the lowest mean number of references per article.

The pattern of distribution of source articles by methodology and by number of references made to journal articles is shown in Table 4-7. The differences in the distributions of the numbers of references for each methodology appear to be slight.

In Table 4-8 the frequency distribution of the source articles by methodology and by subject is shown. It is not surprising that 82.6% of the articles on library history used historical methods; 67.9% of all the articles using historical methods are on the history of libraries. Other interesting points from this analysis include:

- 90.0% of the articles on information science theory used theoretical/analytic methods.
- Of the articles on automation, 36.7% used theoretical/analytic methods and 30.6% used system design methods.
- Half of the articles using system design were about automation.
- 45.2% of the articles using bibliometrics were on library materials.
- Almost 60% of the surveys on the public were specifically about library services.
- 45.6% of the articles on library services used surveys or experiments on libraries.

TABLE 4-6: Mean Number of References per Article in Each Methodology Category

Methodology:	Number of Articles Using	Total References	Mean
Theoretical/Analytic	82	1158	14.1
Information System Design	30	332	11.1
Surveys on the Library Public	22	196	8.9
Surveys or Experiments on Libraries	138	1195	8.7
Bibliometrics	42	356	8.5
Content Analysis	11	112	10.2
Secondary Analysis	27	428	15.9
Historical	28	997	35.6
Descriptive Bibliography	1	12	12.0
Comparative	3	47	15.7
Other	2	15	7.5
TOTAL USES	386		

TABLE 4-7: Methodologies of Source Articles from Core Library Journals by References to Journal Articles

Methodology:	Number of References to Journal Articles													TOTAL
	0	1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-29	30+	
Theoretical/Analytic	12	5	15	15	8	7	5	3	3	1	3	3	2	82
Information System Design	8	2	6	3	2	5	1	2	0	0	1	0	0	30
Surveys on the Library Public	3	4	4	4	2	3	2	0	0	0	0	0	0	22
Surveys or Experiments on Libraries	41	8	25	22	13	8	4	8	4	1	2	2	0	138
Bibliometrics	6	6	5	4	8	5	4	3	1	0	0	0	0	42
Content Analysis	3	3	2	0	2	0	0	0	0	0	0	1	0	11
Secondary Analysis	4	1	5	4	2	3	4	0	1	1	0	0	2	27
Historical	4	4	2	3	4	1	0	1	1	1	2	2	3	28
Descriptive Bibliography	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Comparative	0	0	0	2	1	0	0	0	0	0	0	0	0	3
Other	1	0	0	0	0	1	0	0	0	0	0	0	0	2
TOTAL	82	33	65	57	42	33	20	17	10	4	8	8	7	386

38

TABLE 4-8 : Methodologies of Source Articles from Core Library Journals by Subject of Article

Methodology:	Subject of Article									TOTAL
	Admin-istration	Library Service	Technical Processes	Materials	Auto-mation	History	Info.Sci. Theory	Unclassi-fiable	Tangen-tial	
Theoretical/Analytic	16	18	7	12	18	0	9	0	2	82
Information System Design	0	1	11	2	15	0	0	0	1	30
Surveys on the Library Public	0	13	1	3	3	0	0	0	2	22
Surveys or Experiments on Libraries	51	36	14	17	8	2	0	5	5	138
Bibliometrics	1	4	11	19	4	0	1	0	2	42
Content Analysis	1	2	3	2	0	1	0	0	2	11
Secondary Analysis	12	3	2	6	0	1	0	1	2	27
Historical	1	1	0	2	0	19	0	0	5	28
Descriptive Bibliography	0	0	0	1	0	0	0	0	0	1
Comparative	1	1	0	0	0	0	0	1	0	3
Other	0	0	0	1	1	0	0	0	0	2
TOTAL	83	79	49	65	49	23	10	7	21	386

- 61.5% of the articles on administration used surveys or experiments on libraries; 37.0% of the surveys or experiments on libraries were about library administration.
- 44.4% of the articles using secondary analysis were about administration.

In Table 4-9 the source articles are described by methodology used and by source journal. In general a broad range of research methodologies has been used by the authors in each of the journals included in this survey. There are some interesting deviations.

- 65.0% of the source articles in College and Research Libraries were based on surveys or experiments on libraries.
- In Information Processing and Management 50.0% of the source articles were theoretical/analytic and 35.7% were based on information system design.
- 62.5% of the source articles in Journal of Academic Librarianship were based on surveys or experiments on libraries.
- All 9 (100%) of the source articles published in Journal of Documentation during 1980 were theoretical/analytic.
- 57.9% of the source articles in Journal of Education for Librarianship were based on surveys or experiments on libraries.
- In the Journal of Library History 87.5% of the source articles used historical methods.
- Source articles published in the Journal of the American Society for Information Science during 1980 were characterized as 40.0% theoretical/analytic, 28.6% bibliometrics and 17.1% surveys or experiments on libraries.
- 64.3% of the source articles in Law Library Journal were based on surveys or experiments on libraries.

TABLE 4-9 : Methodologies of Source Articles for Each Source Journal

Methodology: / Journal:	Theoretical Analytic	Info.Systes Design	Surveys on Lib.Public	Surveys & Expe. on Libs.	Biblio-metrics	Content Analysis	Secondary Analysis	Historical	Descrip. Bibliog.	Compara-tive	Other	TOTAL
1. Amer.Archivist	0	2	0	4	0	0	0	5	0	0	0	11
2. Amer.Libs.	0	0	0	1	0	0	1	0	0	0	0	2
3. Aslib Proc.	6	0	4	6	3	2	1	0	0	0	0	22
4. BSSL	0	0	1	3	1	0	1	0	0	0	0	6
5. Can. LJ	0	0	0	3	0	1	0	0	0	0	0	4
6. CRL	2	0	1	13	2	1	0	1	0	0	0	20
7. Drexel LQ	0	0	0	2	0	0	0	0	0	0	0	2
8. Film LQ	0	0	0	0	0	0	0	1	0	0	0	1
9. Govt.Pub.Rev.	0	1	0	4	1	0	0	0	0	0	0	6
10. IFLA	1	0	0	0	0	0	0	0	0	0	0	1
11. IPM	7	5	0	0	1	1	0	0	0	0	0	14
12. Inter.Lib.Rev.	3	0	0	3	0	0	0	0	0	1	0	7
13. J of Acad.Lbnshp.	4	0	0	10	1	0	1	0	0	0	0	16
14. J of Doc.	9	0	0	0	0	0	0	0	0	0	0	9
15. J Educ.Lbnshp.	4	0	0	11	0	0	4	0	0	0	0	19
16. J Info.Science	9	5	2	0	3	1	2	0	0	0	1	23
17. J Lbnshp.	0	1	1	3	1	0	1	2	0	0	0	9
18. J Lib.Auto.	0	0	0	0	0	0	0	0	0	0	0	0
19. J Lib.Hist.	0	0	0	0	0	0	0	7	1	0	0	8
20. JASIS	14	2	1	6	10	0	2	0	0	0	0	35
21. Law LJ	0	1	0	9	0	1	1	2	0	0	0	14
22. Lib.Acq.	3	0	0	1	4	0	0	0	0	0	0	8
23. Lib.Assoc.Rec.	1	0	0	2	1	0	0	0	0	0	0	4
24. Lib.Hist.	0	0	0	0	0	0	0	0	0	0	0	0
25. LJ	1	1	0	4	1	0	2	0	0	0	0	9
26. LQ	2	0	2	2	1	0	0	4	0	0	0	11
27. LRTS	3	3	0	7	4	0	1	0	0	0	0	18
28. Lib.Tech.Rep.	0	0	0	8	0	0	0	0	0	0	0	8
29. Lib. Trends	1	1	0	6	0	0	3	2	0	1	0	14
30. Libri	0	0	1	1	0	1	1	3	0	0	0	7
31. Med.Lib.Assoc.	2	0	1	8	3	1	2	0	0	1	0	18
32. Online	0	0	0	1	1	0	0	0	0	0	0	2
33. Online Rev.	3	0	0	3	0	0	0	0	0	0	0	6
34. RQ	2	0	4	3	0	1	0	1	0	0	0	11
35. Schol.Pub.	0	1	0	4	1	0	1	0	0	0	0	7
36. School LJ	0	0	1	3	0	1	0	0	0	0	0	5
37. School Media Q	0	0	0	0	1	0	0	0	0	0	0	1
38. Serials Lbn.	2	0	1	0	1	0	1	0	0	0	0	5
39. Special Libs.	2	6	2	5	1	0	0	0	0	0	1	17
40. UNESCO JIS	1	1	0	2	0	0	2	0	0	0	0	6
41. Wilson Lib.Bul.	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	82	30	22	138	42	11	27	28	1	3	2	386

4.3 Subjects of the Source Articles

In Table 4-10 the distribution of the source articles by subject is shown. It may be surprising to see how the articles are almost evenly divided among the subjects except history and information science theory (the class added to accommodate some otherwise unclassifiable source articles).

Since the subject classification scheme used was adapted from LaBorie and Halperin (see section 3.4), it is legitimate to compare the results of this study of source articles with their study of library science dissertations written from 1969 to 1972. The only striking differences between the 1969-1972 dissertations and the 1980 source articles is an almost three-fold increase in articles on automation and a decline in emphasis on history (15.0% of the dissertations compared with 6.7% of the source articles).

The distribution of source articles by subject and source journal is shown in Table 4-11. For each journal, articles of different subjects were fairly well distributed. Several interesting, but unsurprising, deviations are noted below.

- Over half (54.5%) of the source articles in American Archivist in 1980 were concerned with materials.
- Over half (53.9%) of the source articles in Information Processing and Management in 1980 were categorized as automation.
- 42.9% of the source articles in the Journal of Academic Librarianship discussed library services.
- 85.7% of the source articles in Journal of Education for Librarianship were concerned with library administration (which includes personnel development and education).

TABLE 4-10: Subject Distribution of the Source Articles in Core Library Journals of 1980

Subject:	Number of Articles	% of Total	Subject Distribution of Lib.Sci. Dissertations, 1969-1972*
Administration	71	20.7%	23.7%
Library Service	68	19.8	21.0
Technical Processes	45	13.1	14.0
Materials	53	15.5	21.5
Automation	47	13.7	4.8
History	23	6.7	15.0
Information Science Theory	9	2.6	--
Unclassifiable	7	2.0	--
Tangential to Librarianship	20	5.8	--
TOTAL	343	100.0%	100.0%

*LaBorie and Halperin, p. 274.

TABLE 4-11: Source Articles in Core Library Journals of 1980 by Source Journal and Subject

Subject: / Journal:	Administration	Library Service	Technical Processes	Materials	Automation	History	Info.Science Theory	Unclassifiable	Tangential to Lbnshp.	TOTAL
1. Amer.Archivist	2	0	0	6	0	1	0	0	2	11
2. Amer.Libs.	1	0	0	0	0	0	0	0	0	1
3. Aslib Proc.	1	5	1	3	4	0	1	0	1	16
4. BSSL	1	1	1	0	1	0	0	0	1	5
5. Can. LJ	2	0	0	2	0	0	0	0	0	4
6. CRL	7	5	1	4	0	0	0	1	0	18
7. Drexel LQ	0	0	0	2	0	0	0	0	0	2
8. Fils LQ	0	0	0	0	0	0	0	0	1	1
9. Govt.Pub.Rev.	0	2	1	3	0	0	0	0	0	6
10. IFLA	0	1	0	0	0	0	0	0	0	1
11. IPM	1	1	3	0	7	0	1	0	0	13
12. Inter.Lib.Rev.	3	1	0	0	0	0	0	2	1	7
13. J of Acad.Lbnshp.	3	6	2	2	0	1	0	0	0	14
14. J of Doc.	0	3	1	3	1	0	1	0	0	9
15. J Educ.Lbnshp.	12	1	0	1	0	0	0	0	0	14
16. J Info.Science	2	1	2	2	7	0	5	0	2	21
17. J Lbnshp.	2	1	2	2	0	1	0	0	0	8
18. J Lib.Auto.	0	0	0	0	0	0	0	0	0	0
19. J Lib.Hist.	0	0	0	1	0	7	0	0	0	8
20. JASIS	1	5	5	4	11	0	1	1	0	28
21. Law LJ	6	1	4	0	0	0	0	1	2	14
22. Lib.Acq.	1	2	2	1	0	0	0	0	1	7
23. Lib.Assoc.Rec.	1	1	0	1	0	1	0	0	0	4
24. Lib.Hist.	0	0	0	0	0	0	0	0	0	0
25. LJ	4	1	1	2	0	0	0	0	0	8
26. LQ	1	3	0	1	0	4	0	0	0	9
27. LRTS	1	0	11	4	0	0	0	0	0	16
28. Lib.Tech.Rep.	7	0	1	0	0	0	0	0	0	8
29. Lib. Trends	1	8	1	0	0	2	0	0	1	13
30. Libri	1	1	0	0	0	4	0	0	0	6
31. Med.Lib.Assoc.	4	4	1	4	0	1	0	2	0	16
32. Online	0	0	0	0	2	0	0	0	0	2
33. Online Rev.	0	1	0	0	5	0	0	0	0	6
34. RQ	0	7	0	0	0	1	0	0	0	8
35. Schol.Pub.	0	1	1	0	0	0	0	0	5	7
36. School LJ	0	2	1	0	0	0	0	0	2	5
37. School Media Q	0	0	0	1	0	0	0	0	0	1
38. Serials Lbn.	0	0	0	3	1	0	0	0	0	4
39. Special Libs.	3	3	2	1	8	0	0	0	0	17
40. UNESCO JIS	3	0	1	0	0	0	0	0	1	5
41. Wilson Lib.Bul.	0	0	0	0	0	0	0	0	0	0
TOTAL	71	68	45	53	47	23	9	7	20	343

- 87.5% of the source articles in Journal of Library History were categorized as library history.
- In Library Resources and Technical Services 68.8% of the source articles focussed on technical processes.
- In Library Technology Reports 87.5% of the source articles were concerned with library administration (which includes library equipment).
- 83.3% of the source articles in Online Review during 1980 were categorized as automation.
- In RQ 87.5% of the source articles were concerned with library services.

The source articles of 1980 were crossclassified by subject and total number of references of article (see Table 4-12). A few interesting patterns are evident.

- Of all the source articles with no references, over a third (36.4%) were about library administration.
- 44.4% of the source articles on information science theory had no references.
- Of the source articles on library history, 73.9% had 18 or more references.

4.4 References of the Source Articles

In Table 4-13 the numbers of references (total references and references to journal articles only) made in the 343 source articles are shown. The number of references in the source articles ranged from 0 to 84, the mean was 12.6 and the median was nine references. Sixteen percent of the source articles had no references; 28.2% of the source articles had less than four references. Of all references,

TABLE 4-12: Source Articles from Core Library Journals by Subject of Article and Total Number of References

Subject:	Total Number of References													
	0	1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-29	30+	TOTAL
Administration	20	3	2	3	2	3	7	8	3	3	3	5	9	71
Library Service	9	2	7	7	10	7	3	2	2	2	4	12	1	68
Technical Processes	6	2	6	6	5	4	2	4	3	1	1	3	2	45
Materials	3	2	6	5	4	3	7	6	2	3	3	6	3	53
Automation	6	1	6	2	5	2	6	3	4	2	1	6	3	47
History	3	0	1	0	0	1	0	1	0	0	3	2	12	23
Information Science Theory	4	0	0	1	0	1	0	0	0	1	1	1	0	9
Unclassifiable	1	1	2	1	0	0	0	2	0	0	0	0	0	7
Tangential to Librarianship	3	0	1	3	2	3	1	1	1	0	1	1	3	20
TOTAL	55	11	31	28	28	24	26	27	15	12	17	36	33	343

TABLE 4-13: Distribution of Source Articles from Core Library Journals of 1980 by Total Number of References and by Number of References to Journal Articles

Number of References	Total References		References to Journal Articles	
	Articles	% of Total	Articles	% of Total
0	55	16.0%	77	22.4%
1	11	3.2	30	8.7
2-3	31	9.0	56	16.3
4-5	28	8.2	51	14.9
6-7	28	8.2	37	10.8
8-9	24	7.0	29	8.5
10-11	26	7.6	16	4.7
12-13	27	7.9	14	4.1
14-15	15	4.4	9	2.6
16-17	12	3.5	3	0.9
18-19	17	5.0	7	2.0
20-29	36	10.5	8	2.3
30+	33	9.6	6	1.7
TOTAL	343	100.0%	343	100.0%
Range	0 - 84		0 - 40	
Mean	12.6		5.6	
Median	9		3.5	

44.5% were to journal articles. The range of references made to journal articles was 0 to 40, the mean was 5.6 and the median was between three and four references.

These data support Peritz's conclusion that the mean and median number of references of research articles in librarianship literature is increasing. She found that the mean and median number of references rose consistently from 1950 to 1975 at which time the mean stood at 8.7 and the median stood at 5.8 references.[32] Peritz also demonstrates that the proportion of articles with no references declined over the study period to 16% in 1975.[33] Further decline is not supported by the results of this study which show 16.0% of the source articles with no references.

The proportion of references made to journal articles in the present study is fairly consistent with the proportions calculated for 1950-1975 by Peritz.[34] LaBorie and Halperin found that the 1969-1972 library science dissertations cited journals in only 23.2% of their references,[35] a difference likely attributable to the different type of source material.

In Table 4-14 the number of references made by source articles in each of the core journals is shown. A few interesting points are noted. For several journals the proportion of source articles with no references was high: Law Library Journal (35.7%), Library Association Record (100%), Library Journal (37.5%), Library Technology Reports (75.0%), and School Library Journal (80.0%). For other journals the proportion of source articles with 18 or more references was high: Library Quarterly (88.9%), Library Trends (53.9%), and Libri (83.3%).

TABLE 4-14: Source Articles of Core Library Journals in 1980 by Source Journal and Total Number of References

Journal:	Number of References													
	0	1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-29	30+	TOTAL
1. Amer.Archivist	1	0	0	3	0	1	1	2	0	0	1	1	1	11
2. Amer.Libs.	0	0	0	0	0	0	0	0	1	0	0	0	0	1
3. Aslib Proc.	3	0	2	1	4	2	0	0	1	0	1	1	1	16
4. BSSL	1	0	0	0	0	1	0	2	0	1	0	0	0	5
5. Can. LJ	2	0	1	1	0	0	0	0	0	0	0	0	0	4
6. CRL	0	0	0	2	2	2	1	3	0	1	3	3	1	18
7. Drexel LQ	0	0	0	0	0	0	1	0	1	0	0	0	0	2
8. Film LQ	0	0	0	0	0	0	0	0	0	0	0	0	1	1
9. Govt.Pub.Rev.	0	0	3	1	0	0	0	0	0	1	0	1	0	6
10. IFLA	0	0	0	0	0	1	0	0	0	0	0	0	0	1
11. IPM	0	2	0	0	0	1	1	1	2	2	2	1	1	13
12. Inter.Lib.Rev.	2	0	1	0	0	0	0	1	0	0	1	0	2	7
13. J of Acad.Lbnshp.	2	0	2	3	3	1	0	0	0	0	0	2	1	14
14. J of Doc.	0	0	1	0	0	0	2	1	0	0	2	1	2	9
15. J Educ.Lbnshp.	1	1	1	0	0	2	2	1	0	2	0	3	1	14
16. J Info.Science	5	0	3	1	4	1	1	2	0	0	0	1	3	21
17. J Lbnshp.	1	0	1	0	1	0	0	0	2	1	0	0	2	8
18. J Lib.Auto.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19. J Lib.Hist.	1	0	0	0	0	0	0	1	0	0	1	1	4	8
20. JASIS	0	0	3	3	2	1	4	1	5	1	2	5	1	28
21. Law LJ	5	1	2	2	0	0	0	1	0	0	0	0	3	14
22. Lib.Acq.	2	0	0	1	1	1	1	0	0	0	0	0	1	7
23. Lib.Assoc.Rec.	4	0	0	0	0	0	0	0	0	0	0	0	0	4
24. Lib.Hist.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25. LJ	3	0	0	1	0	1	2	1	0	0	0	0	0	8
26. LQ	0	0	0	0	0	1	0	0	0	0	1	3	4	9
27. LRTS	2	1	0	2	3	4	0	2	0	0	0	2	0	16
28. Lib.Tech.Rep.	6	0	0	0	0	0	1	1	0	0	0	0	0	8
29. Lib.Trends	0	1	0	1	2	0	1	1	0	0	1	5	1	13
30. Libri	0	0	0	0	0	0	0	1	0	0	1	1	3	6
31. Med.Lib.Assoc.	1	0	3	2	1	0	3	2	1	2	0	1	0	16
32. Online	2	0	0	0	0	0	0	0	0	0	0	0	0	2
33. Online Rev.	1	0	2	1	0	1	0	0	0	0	0	1	0	6
34. RQ	2	1	3	0	1	1	0	0	0	0	0	0	0	8
35. Schol.Pub.	1	0	0	2	0	1	0	0	1	0	1	1	0	7
36. School LJ	4	0	0	0	0	0	1	0	0	0	0	0	0	5
37. School Media Q	0	1	0	0	0	0	0	0	0	0	0	0	0	1
38. Serials Lbn.	0	1	0	1	0	0	0	0	0	1	0	1	0	4
39. Special Libs.	3	2	2	0	4	1	3	2	0	0	0	0	0	17
40. UNESCO JIS	0	0	1	0	0	0	1	1	1	0	0	1	0	5
41. Wilson Lib.Bul.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	55	11	31	28	28	24	26	27	15	12	17	36	33	343

Since there are so few source articles from some of the core journals, a different perspective on the differences among journals is presented in Table 4-15 where the average number of references per article for each journal is shown. About half of the core library journals averaged ten references or less per research article. Caution must be taken in interpreting these results since the number of source articles per journal varied so widely.

TABLE 4-15: Core Library Journals Ordered by Mean Number of References per Research Article in 1980

Journal:	Number of Research Articles	Mean
J Lib.Auto.	0	0
Lib. Hist.	0	0
Wilson Lib.Bul.	0	0
Lib.Assoc.Rec.	4	0
Online	2	0
School Media Q	1	1.0
Can. LJ	4	1.8
School LJ	5	2.2
Lib.Tech.Rep.	8	2.9
RQ	8	2.9
Special Libs.	16	5.7
LJ	8	6.6
Online Rev.	6	6.7
Drexel Lib. Q	2	7.5
Lib.Acq.	7	8.5
Govt.Pub.Rev.	6	8.5
Serials Lbn.	4	8.6
LRTS	16	8.6
J Acad.Lbnshp.	14	8.9
IFLA	1	9.0
Aslib Proc.	16	9.1
Med.Lib.Assoc.	16	9.4
CRL	18	10.9
Schol.Pub.	7	11.1
BSSL	6	11.3
Law LJ	14	11.4
UNESCO JIS	5	13.2
Amer.Archivist	11	13.3
JASIS	28	13.7
JIS	21	14.4
IPM	13	14.6
Amer.Libs.	1	15.0
J Lbnshp.	8	15.3
J Educ.Lbnshp.	14	15.5
Inter.Lib.Rev.	7	17.0
Lib. Trends	13	18.2
J of Doc.	9	23.1
LQ	9	30.1
J Lib.Hist.	8	32.9
Libri	6	37.0
Film LQ	1	50.0

5. THE SAMPLE SOURCE ARTICLES AND THE ARTICLES THEY CITE

5.1 The Sample Source Articles

The sampling design guaranteed that the distribution of the 100 sample source articles would be identical to the distribution of the 188 articles in the frame with respect to two variables: research method and number of references to journal articles. It is interesting to compare the sample to the sample frame with respect to other variables, namely source journal and subjects of articles. In the frame, 30 journals were represented; 25 different journals were included in the sample. The relative distribution of subjects in the sample compared with the sampling frame is shown in Table 5-1. The distribution of subjects within the sample very closely resembles the distribution of subjects within the sampling frame with perhaps a slight overrepresentation of articles on automation. From these simple comparisons it can be concluded that the sample is highly representative of the sampling frame. A fuller description of the sample source articles would be redundant since all 343 source articles were described in chapter 4. The journal articles cited by the sample source articles are described in the following sections.

5.2 Research Methods of the Cited Articles

Of the 708 journal articles cited by the sample source articles, 14 were missing and 234 (or 33.1%) were non-research articles, leaving 460 total research articles cited. The distribution of the cited

TABLE 5-1: Distribution of Source Articles from the Core Library Journals of 1980 by Subject in the Sample and the Sampling Frame

Subject:	Sample		Frame	
	Freq.	%	Freq.	%
Administration	18	18.0%	38	20.2%
Library Service	26	26.0	45	23.9
Technical Processes	12	12.0	28	14.9
Materials	18	18.0	36	19.2
Automation	22	22.0	33	17.6
History	--	--	1	.5
Information Science Theory	3	3.0	5	2.7
Unclassifiable	1	1.0	2	1.0
TOTAL	100	100.0%	188	100.0%

research articles by methodology is shown in Table 5-2. Over a third (33.7%) of these references are to theoretical/analytic articles. Another third (35.2%) of the cited research articles are in the two survey methods classes. A remarkable characteristic of this distribution is its similarity to the distribution of research articles in the sampling frame by research methodology. The only variations imply that perhaps a lower proportion of surveys or experiments are cited than published and the bibliometric studies are cited more frequently than would be expected since bibliometric source articles had fewer references than did other methodologies (section 4.2).

5.3 Subjects of the Cited Articles

The extent to which different disciplines cite themselves has been an interesting area of exploration. A test of self-citation within librarianship is possible from the data collected for this study. In Table 5-3 the distribution of the cited research articles by subject is given. More than 85% of these articles were in the field of library and information science. (A 95% confidence interval for the proportion of cited articles in the field of library and information science in the sampling frame is 85.2 $\pm$ 3%.)

Other researchers have also found a very high degree of self-citation within librarianship. LaBorie and Halperin found that 58% of the references from the library science dissertations studied were to library and information science literature.[36] From the social science citation analyses carried out as part of the Design of Information Systems in the Social Sciences (DISISS) program, Line also found a high rate of "self-sufficiency" in librarianship: 62% of the references from journals in librarianship and 73% of the references

TABLE 5-2: Distribution of Research Articles Referenced by the 100 Sample Source Articles by Research Method, Compared with the Distribution of Articles in the Sampling Frame by Research Method

Methodology:	Referenced Articles		Articles
	No.	%	%
Theoretical/Analytic	155	33.7%	32.4%
Information System Design	41	8.9	10.1
Surveys on the Library Public	22	4.8	4.3
Surveys or Experiments	140	30.4	41.0
Bibliometrics	88	19.1	12.2
Content Analysis	1	.2	--
Secondary Analysis	12	2.6	--
Historical	1	.2	--
TOTAL*	460	100.0%	100.0%

*460 Research articles were referenced. Of the 708 referenced articles, 234 were not research articles and 14 were missing.

TABLE 5-3: Distribution of the Referenced Articles by Subject

Subject:	No.	%
Library & Information Sciences	392	85.2%
Printing, Publishing and Book Production	1	.2
Philosophy, Linguistics	1	.2
Education	4	.9
Psychology, Sociology and Communication	33	7.2
Management, Business Administration and Economics	10	2.2
Life Sciences, Physical Sciences	5	1.1
Computer Science, Electrical Engineering	8	1.7
Mathematics, Statistics	6	1.3
TOTAL*	460	100.0%

*460 Research articles were referenced. Of the 708 referenced articles, 234 were not research articles and 14 were missing.

from monographs in librarianship were to library literature.[37] Peritz reported a consistent self-citation rate in librarianship of around 80% with little change from 1950 to 1975.[38] From these studies and the supportive results from the present study, it can be concluded that librarianship has very little interaction with other disciplines. The higher figure for self-citation obtained from the present study may be attributed to the fact that subject of referenced article was only noted in the cases of the 460 research journal articles cited, not all references.

In Table 5-4 the relative distribution of the referenced articles by subject for each methodology class is given. There appear to be only slight differences in the subject distributions among the different methodologies.

5.4 Age of the Cited Articles

In Table 5-5 the age distribution of all the journal articles cited by the sample source articles is given. Over half (56.5%) of the cited articles were five years old or less, implying that the journal literature referenced by research articles in librarianship is quite recent (Price's "research front"[39]). Over 75% of the journal articles cited were nine years old or less. The mean age of journal articles cited by the sample source articles was 6.8 years and the standard deviation is 6.7. (A 95% confidence interval for the true mean of the age of journal articles cited in the sampling frame is 6.8 $\pm$ .35 years based on this sample.) The median age of cited journal articles was four years. These sample statistics describe a distribution that is highly skewed toward the older literature. This is also evidenced by the range of values for the age of cited journal articles which was 0 to 80 years.

TABLE 5-4: Relative Distribution of Articles Referenced by 100 Sample Source Articles in Core Library Journals by Subject for Each Research Methodology

Subject of Referenced Article:	Methodology of Referenced Article							
	Theoretical/ Analytic	Information System Design	Surveys on Lib. Public	Surveys or Experiments	Biblio-metrics	Content Analysis	Secondary Analysis	Historical
Library & Information Sciences	.81	.88	1.0	.84	.90	1.0	.83	1.0
Printing, Publishing and Book Production	--	--	--	.01	--	--	--	--
Philosophy, Linguistics	.01	--	--	--	--	--	--	--
Education	--	--	--	.01	.01	--	.08	--
Psychology, Sociology and Communication	.09	--	--	.08	.08	--	.08	--
Management, Business Admin. and Economics	.04	--	--	.03	--	--	--	--
Life Sciences, Physical Sciences	--	--	--	.03	.01	--	--	--
Computer Science, Electrical Engineering	.01	.12	--	.01	--	--	--	--
Mathematics, Statistics	.04	--	--	--	--	--	--	--
History	--	--	--	--	--	--	--	--
TOTAL	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

TABLE 5-5: Age Distribution of Journal Articles Referenced by 100 Sample Source Articles in Core Library Journals of 1980

Age (years)	No.	%
0*	26	3.7%
1	61	8.6
2	98	13.8
3	100	14.1
4	59	8.3
5	56	7.9
6	53	7.5
7	46	6.5
8	37	5.2
9	26	3.7
10	21	3.0
11	27	3.8
12	13	1.8
13	13	1.8
14	6	.8
15+	66	9.3
TOTAL	708	100.0%

Range = 0 - 80 years

Mean = 6.79 years

Standard Deviation = 6.67 years

Median = 4 years

*0 years = 1980, the year of the source article. (Generally these references were "In press" when the source article was published.)

In Table 5-6 the mean and median age of the cited journal articles is given for each methodology class. It is interesting that the mean and median age of referenced articles that are bibliometric studies were lower than the others and the median age for referenced articles that are theoretical/analytic research was higher.

Peritz,[40] LaBorie and Halperin[41] and Line[42] also found that the references from library literature are fairly recent. It must be noted that in the present study only the journal articles cited by source journal articles are considered and therefore generalizations to all references in librarianship are not appropriate. Line has shown that, as a group, references from journals differ from references from all materials, references to journals differ from references to all materials and references from ranked journals differ from references from random journals.[43]

5.5 The Referenced Journals

Data from the references (footnotes or bibliographic entries) were collected on the journal indicated by the reference, i.e., the journals being cited by the sample source articles. The referenced journals were recorded as one of the 41 core journals, or "other." The "other" category included some library journals (particularly state and local journals) and journals outside the field of librarianship. In Table 5-7 the distribution of references made to these journals is shown. Only a third (38.3%) of the references were to journals outside the core. Since several library journals were coded in this "other" category, this figure is another indication of the closed nature of research in librarianship.

TABLE 5-6: Mean and Median Age of Referenced Articles for Each Research Method

Methdology of Referenced Articles:	Age of Referenced Articles (years)	
	Mean	Median
Theoretical/Analytic	7.8 years	6 years
Information System Design	8.1	5
Surveys on Library Public	6.5	5
Surveys or Experiments	6.2	5
Bibliometrics	6.1	4

TABLE 5-7: The Journals Referenced by 100 Sample Source Articles in Core Library Journals of 1980

Journal:	No. of Times Referenced	% of All References
1. Amer.Archivist	6	.8%
2. Amer.Libs.	9	1.3
3. Aslib Proc.	21	3.0
4. BSSL	0	--
5. Can. LJ	2	.3
6. CRL	50	7.1
7. Drexel LQ	6	.8
8. Film LQ	0	--
9. Govt.Pub.Rev.	8	1.1
10. IFLA	0	--
11. IPM	20	2.8
12. Inter.Lib.Rev.	2	.3
13. J of Acad.Lbnshp.	13	1.8
14. J of Doc.	29	4.1
15. J Educ.Lbnshp.	21	3.0
16. J Info. Science	3	.4
17. J Lbnshp.	12	1.7
18. J Lib.Auto.	14	2.0
19. J Lib.Hist.	1	.1
20. JASIS	75	10.6
21. Law LJ	8	1.1
22. Lib.Acq.	3	.4
23. Lib.Assoc.Rec.	3	.4
24. Lib.Hist.	0	--
25. LJ	16	2.3
26. LQ	11	1.6
27. LRTS	30	4.2
28. Lib.Tech.Rep.	0	--
29. Lib. Trends	3	.4
30. Libri	3	.4
31. Med.Lib.Assoc.	18	2.5
32. Online	2	.3
33. Online Rev.	7	1.0
34. RQ	8	1.1
35. Schol.Pub.	0	--
36. School LJ	2	.3
37. School Media Q	0	--
38. Serials Lbn.	3	.4
39. Special Libs.	22	3.1
40. UNESCO JIS	3	.4
41. Wilson Lib.Bul.	3	.4
Other	271	38.3
TOTAL	708	100.0%

From the distribution of references made to the various journals by the sample source articles, it can be seen that the five most frequently cited journals were Journal of the American Society for Information Science, College and Research Libraries, Library Resources and Technical Services, Journal of Documentation and Special Libraries.

The distribution of the referenced articles by research method and by referenced journal is shown in Table 5-8. Interesting referenced journal characteristics are noted below.

- For six journals, more than 70% of the references to them were to research articles: Journal of the American Society for Information Science (93.3%), Bulletin of the Medical Library Association (88.9%), Library Quarterly (81.8%), College and Research Libraries (76.0%), Government Publications Review (75.0%) and Journal of Documentation (72.4%).
- 69.4% of the references to non-core journals were to research articles, a slightly higher proportion than for references to all journals (66.9%).
- The non-core journals contained almost half of the references to theoretical (42.6%), system design (51.2%) and bibliometric (46.6%) research articles.
- Almost a third (32.0%) of the references to College and Research Libraries were to theoretical research.
- Half (50.0%) of the references to Government Publications Review were to reports of surveys or experiments.
- Of the references to Information Processing and Management, 40.0% were to theoretical research and 30.0% were to surveys or experiments.

TABLE 5-8: Articles Referenced by 100 Sample Source Articles in Core Library Journals of 1980 by Referenced Journal and by Research Method

Methodology of References: / Journal:	Theoretical Analytic	Info.System Design	Surveys on Lib.Public	Surveys or Experiments	Biblio-metrics	Content Analysis	Secondary Analysis	Historical	Not Research	Missing	TOTAL
1. Amer.Archivist	1	0	0	0	0	0	0	0	5	0	6
2. Amer.Libs.	0	0	0	2	0	0	0	0	7	0	9
3. Aslib Proc.	3	2	2	1	1	0	0	0	12	0	21
4. BSSL	0	0	0	0	0	0	0	0	0	0	0
5. Can. LJ	0	0	0	0	0	0	0	0	2	0	2
6. CRL	16	0	3	10	9	0	0	0	12	0	50
7. Drexel LQ	0	0	0	0	0	0	0	0	6	0	6
8. Film LQ	0	0	0	0	0	0	0	0	0	0	0
9. Govt.Pub.Rev.	0	0	0	4	0	0	1	1	2	0	8
10. IFLA	0	0	0	0	0	0	0	0	0	0	0
11. IPM	8	2	0	6	4	0	0	0	0	0	20
12. Inter.Lib.Rev.	0	0	0	0	0	0	0	0	2	0	2
13. J of Acad.Lbnshp.	0	0	2	3	1	0	0	0	7	0	13
14. J of Doc.	6	0	6	5	4	0	0	0	8	0	29
15. J Educ.Lbnshp.	0	0	0	10	0	0	1	0	10	0	21
16. J Info.Science	2	0	0	0	0	0	1	0	0	0	3
17. J Lbnshp.	0	0	1	3	0	0	1	0	7	0	12
18. J Lib.Auto.	3	2	0	5	0	0	0	0	4	0	14
19. J Lib.Hist.	0	0	0	0	0	0	0	0	1	0	1
20. JASIS	31	9	1	15	14	0	0	0	5	0	75
21. Law LJ	0	0	0	6	0	0	0	0	2	0	8
22. Lib.Acq.	0	0	0	0	0	0	0	0	3	0	3
23. Lib.Assoc.Rec.	2	0	0	0	0	0	0	0	1	0	3
24. Lib.Hist.	0	0	0	0	0	0	0	0	0	0	0
25. LJ	0	0	0	3	3	0	2	0	8	0	16
26. LQ	3	0	1	2	2	1	0	0	2	0	11
27. LRTS	5	4	0	6	1	0	2	0	12	0	30
28. Lib.Tech.Rep.	0	0	0	0	0	0	0	0	0	0	0
29. Lib. Trends	0	0	0	0	0	0	0	0	3	0	3
30. Libri	0	1	0	0	0	0	0	0	2	0	3
31. Med.Lib.Assoc.	5	0	0	5	5	0	1	0	2	0	18
32. Online	0	0	0	1	0	0	0	0	1	0	2
33. Online Rev.	1	0	0	1	0	0	0	0	4	1	7
34. RQ	0	0	0	4	0	0	0	0	4	0	8
35. Schol.Pub.	0	0	0	0	0	0	0	0	0	0	0
36. School LJ	0	0	0	0	0	0	0	0	2	0	2
37. School Media Q	0	0	0	0	0	0	0	0	0	0	0
38. Serials Lbn.	0	0	0	0	1	0	0	0	2	0	3
39. Special Libs.	2	0	2	6	2	0	0	0	10	0	22
40. UNESCO JIS	0	0	0	1	0	0	0	0	2	0	3
41. Wilson Lib.Bul.	1	0	0	0	0	0	1	0	1	0	3
Other	66	21	4	41	41	0	2	0	83	13	271
TOTAL	155	41	22	140	88	1	12	1	234	14	708

- Over a quarter (27.3%) of all the references to surveys on the library public were in Journal of Documentation.
- Almost half (47.6%) of the references to Journal of Education for Librarianship were to surveys or experiments.
- Over a third (35.7%) of the references to Journal of Library Automation were to surveys or experiments.
- 41.3% of the references to Journal of the American Society for Information Science were to theoretical research.
- 75.0% of the references to Law Library Journal were to surveys or experiments.
- Half (50.0%) of the references to RQ were to surveys or experiments.

Recognizing the limitations of such a comparison, it is interesting to see that the characteristics of references to these journals are very similar to the references from articles in these journals (see section 4.2 and Table 4-10).

5.6 The Relationships between the Sample Source Articles and the Articles They Cite

In this section six relationships between source articles and their references are examined. It is important to note that in the following analyses all referenced articles were treated as equal.

5.6.1 Research Method of Source Article and Cited Article

To test for differences among the distributions of the research methods of the referenced articles, the research method of the sample source articles and the research method of the cited articles were crossclassified. The few referenced articles that were content analysis (1), secondary analysis (12) or historical method (1) were eliminated from the table as were the 14 missing values. (The sampling design

restricted analysis to only five of the methodology classes of articles.) The resulting distribution of source article research method by research method of cited articles is shown in Table 5-9.

The very small p-value associated with chi-square for this table (the p-value is the probability that the observed distribution would occur if there were no relationship between the variables), indicates that a relationship does exist between the research method of an article and the research method of the articles it cites. The relative distribution of the research methods of the cited articles within each article methodology (shown by the row percentages) describes this relationship.

- Theoretical/analytic source articles cited more theoretical/analytic references than any other type of reference.
- The system design source articles were more likely to cite research references that were theoretical or system design research.
- The source articles that were surveys on the library public cited the largest proportion of non-research references than any of the other source article methodologies; the research references cited by these articles were of several different research methods except system design.
- The source articles on surveys or experiments on libraries were somewhat inclined to cite other research articles reporting results of surveys or experiments.
- More than half (58.0%) of the references cited by the bibliometric source articles were bibliometric studies; bibliometric source articles also cited the lowest proportion of non-research compared with the other source article methodology classes.

TABLE 5-9: Sample Distribution of Referenced Articles by Research Method, for Five Research Methods of Source Articles

Research Method of Articles: Freq. (Row %)	Research Method of References: Theoretical Analytic	Info.System Design	Surveys on Lib.Public	Surveys or Experiments	Biblio-metrics	Not Research	TOTAL
Theoretical/Analytic	94 (39.3%)	17 (7.1%)	4 (1.7%)	16 (6.7%)	27 (11.3%)	81 (33.9%)	239 (100.0%)
Info. System Design	22 (33.3%)	16 (24.2%)	0 (0)	7 (10.6%)	2 (3.0%)	19 (28.8%)	66 (100.0%)
Surveys on Lib. Public	7 (14.0%)	0 (0)	8 (16.0%)	9 (18.0%)	4 (8.0%)	22 (44.0%)	50 (100.0%)
Surveys or Experiments on Libraries	28 (11.8%)	6 (2.5%)	9 (3.8%)	95 (40.1%)	4 (1.7%)	95 (40.1%)	237 (100.0%)
Bibliometrics	4 (4.6%)	2 (2.3%)	1 (1.1%)	13 (14.8%)	51 (58.0%)	17 (19.3%)	88 (100.0%)
TOTAL	155 (22.8%)	41 (6.0%)	22 (3.2%)	140 (20.6%)	88 (12.9%)	234 (34.4%)	680 (100.0%)

Excluded from table: 14 references of other methodologies and 14 missing references (28/708=4%).

Chi-square = 430.8 with 20 degrees of freedom; $p < .0001$

It appears that indeed a research article in librarianship is likely to cite research articles of the same research methodology as the article.

5.6.2 Research Method of Source Article and Age of Cited Articles

The age of the referenced journal articles in the sample ranged from 0 to 80 years (see section 5.4). For crossclassifying research methodology of source article with age of cited article, the age of the cited articles was regrouped into recent (0-5 years), average (6-10 years) and old (11 years or more) categories. The distribution of the age of the cited articles for each research method of the source articles is given in Table 5-10.

For each of the five methodology classes tested of the source articles, over half of the cited articles were five years old or less. The relatively high p-value associated with the chi-square test for this table indicates that this distribution may have resulted from chance.

5.6.3 Subject of Source Article and Research Method of Cited Articles

The subjects of the sample source articles were crossclassified with the research methods of the articles cited by them. The resulting distribution is shown in Table 5-11. The chi-square test for this table has a low p-value indicating that a relationship does exist between the two variables tested. The following remarks help to describe this relationship.

- Source articles on all subjects except materials referenced mainly theoretical research or surveys and experiments.

TABLE 5-10: Sample Distribution of Referenced Articles by Age, for Five Research Methods of the Source Articles

Research Method of Articles: Freq. (Row %)	Age (years) Recent 0-5	Average 6-10	Old 11+	TOTAL
Theoretical/Analytic	138 (55.9%)	56 (22.7%)	53 (21.5%)	247 (100.0%)
Info. System Design	38 (55.1%)	24 (34.8%)	7 (10.1%)	69 (100.0%)
Surveys on Lib. Public	34 (65.4%)	14 (26.9%)	4 (7.7%)	52 (100.0%)
Surveys or Experiments on Libraries	139 (56.7%)	60 (24.5%)	46 (18.8%)	245 (100.0%)
Bibliometrics	49 (53.3%)	28 (30.4%)	15 (16.3%)	92 (100.0%)
TOTAL	398 (56.5%)	182 (25.8%)	125 (17.7%)	705 (100.0%)

Excluded from table: 3 references to a secondary analysis article.

Chi-square = 12.4 with 8 degrees of freedom; $p=.14$

TABLE 5-11: Sample Distribution of Referenced Articles by Research Method, for Each Subject of the Source Articles

Subject of Source Article: Freq. (Row %)	Research Method of References: Theoretical Analytic	Info. System Design	Surveys on Lib. Public	Surveys or Experiments	Bibliometrics	Not Research	TOTAL
Administration	32 (18.8%)	0 (0)	2 (1.2%)	49 (28.8%)	8 (4.7%)	79 (46.5%)	170 (100.0%)
Library Service	32 (24.4%)	3 (2.3%)	12 (9.2%)	28 (21.4%)	17 (13.0%)	39 (29.8%)	131 (100.0%)
Technical Processes	10 (12.8%)	8 (10.3%)	5 (6.4%)	11 (14.1%)	6 (7.7%)	38 (48.7%)	78 (100.0%)
Materials	24 (19.7%)	2 (1.6%)	1 (0.8%)	10 (8.2%)	51 (41.8%)	34 (27.9%)	122 (100.0%)
Automation	53 (32.7%)	28 (17.3%)	2 (1.2%)	41 (25.3%)	5 (3.1%)	33 (20.4%)	162 (100.0%)
Info. Science Theory	4 (26.7%)	0 (0)	0 (0)	1 (6.7%)	1 (6.7%)	9 (60.0%)	15 (100.0%)
TOTAL	155 (22.9%)	41 (6.1%)	22 (3.2%)	140 (20.7%)	88 (13.0%)	232 (34.2%)	678 (100.0%)

Excluded from table: 2 references from an article with an unclassifiable subject, 14 references to articles of other methodologies and 14 missing references.

Chi-square = 237.6 with 25 degrees of freedom; $p < .0001$

- The administration, technical processes and information science theory source articles cited more non-research references (almost half of their references) than did source articles on other subjects.
- The source articles concerned with materials referenced more bibliometric studies (41.8%) than did source articles on other subjects.
- The source articles on automation referenced more theoretical and system design research than did the source articles on other subjects.

It is interesting to note the similarites and contrasts between the relationship discussed above and the relationship of the subject of source article to the research method of the source article discussed in section 4.2.

5.6.4 Subject of Source Article and Cited Articles

In section 5.3 it was noted that 85.2% of the referenced research articles were in the field of library and information science. To pursue this relationship further, the subject of each source article was crossclassified with the subjects of the research articles it cited. The resulting distribution is shown in Table 5-12. The different patterns of referenced articles for each subject of the source article can be seen by looking at the row percentages in the table.

- Source articles on technical processes were likely to have more references to library and information science than source articles on other subjects.
- Source articles on library administration were likely to have fewer references to library and information science compared with source articles on other subjects. Almost a quarter (22.3%) of the

TABLE 5-12: Sample Distribution of Referenced Articles by Subject, for Each Subject of Source Article

Subject of Source Articles: Freq. (Row %)	Subject of References: Library and Info. Science	Printing, Publishing	Philosophy, Linguistics	Education	Psych., Socio., Communication	Management, Bus.Admin., Econ.	Life Sciences, Phys. Sciences	Computer, Elec. Engineering	Mathematics, Statistics	TOTAL
Administration	70 (74.5%)	0 (0)	0 (0)	2 (2.1%)	21 (22.3%)	1 (1.1%)	0 (0)	0 (0)	0 (0)	94 (100.0%)
Library Service	81 (83.5%)	0 (0)	0 (0)	1 (1.0%)	4 (4.1%)	8 (8.3%)	2 (2.1%)	0 (0)	1 (1.0%)	97 (100.0%)
Technical Processes	38 (95.0%)	1 (2.5%)	0 (0)	0 (0)	1 (2.5%)	0 (0)	0 (0)	0 (0)	0 (0)	40 (100.0%)
Materials	82 (88.2%)	0 (0)	0 (0)	1 (1.1%)	7 (7.5%)	1 (1.1%)	2 (2.2%)	0 (0)	0 (0)	93 (100.0%)
Automation	116 (89.2%)	0 (0)	1 (0.1%)	0 (0)	0 (0)	0 (0)	0 (0)	8 (6.2%)	5 (3.9%)	130 (100.0%)
Info. Science Theory	5 (83.3%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (16.7%)	0 (0)	0 (0)	6 (100.0%)
TOTAL	392 (85.2%)	1 (0.2%)	1 (0.2%)	4 (0.9%)	33 (7.2%)	10 (2.2%)	5 (1.1%)	8 (1.7%)	6 (1.3%)	460 (100.0%)

references from the administration source articles were to articles on psychology, sociology or communication.

- The source articles on library automation were practically the only source articles to cite computer science/electrical engineering and mathematics/statistics references.

Since Table 5-12 is too sparse for a valid chi-square test, the data were pooled into two categories for subject of references: library and information science and others. This distribution is shown in Table 5-13. The low p-value of the chi-square test for this table indicates the existence of a relationship between the proportion of references made to library and information science literature and subject of the source articles. Source articles on technical processes, materials and automation cited more library and information science articles than source articles of other subjects; source articles on library administration cited fewer library and information science articles than did source articles on other subjects.

5.6.5 Subject of Source Article and Age of Cited Articles

LaBorie and Halperin graphed the relationship between the subject of library dissertation and age of its references. They found that history dissertations cited older references and those on automation cited much more recent references as compared with dissertations on other subjects.[44] To test this relationship on the data from the present study, the age of the articles cited by the sample source articles was crossclassified with the subject of the source article (Table 5-14). The moderately low p-value associated with the chi-square test for this table suggests that there probably is a relationship between the two variables. The data suggest that, as LaBorie and

TABLE 5-13: Sample Distribution of Referenced Articles by Subject (Library and Information Science or Other), for Each Subject of Source Article

Subject of Source Article: Freq. (Row %)	Subject of Referenced Article: Library and Info. Science	Other	TOTAL
Administration	70 (74.5%)	24 (25.5%)	94 (100.0%)
Library Service	81 (83.5%)	16 (16.5%)	97 (100.0%)
Technical Processes	38 (95.0%)	2 (5.0%)	40 (100.0%)
Materials	82 (88.2%)	11 (11.8%)	93 (100.0%)
Automation	116 (89.2%)	14 (10.8%)	130 (100.0%)
Info. Science Theory	5 (83.3%)	1 (16.7%)	6 (100.0%)
TOTAL	392 (85.2%)	68 (14.8%)	460 (100.0%)

Chi-square = 14.0 with 5 degrees of freedom; $p = .016$

TABLE 5-14: Sample Distribution of Referenced Articles by Age for Each Subject of Source Article

Subject of Source Article: Freq. (Row %)	Age of Referenced Articles (years): 0-5	6-10	11+	TOTAL
Administration	87 (49.7%)	50 (28.6%)	38 (21.7%)	175 (100.0%)
Library Service	81 (59.1%)	28 (20.4%)	28 (20.4%)	137 (100.0%)
Technical Processes	41 (52.6%)	19 (24.4%)	18 (23.1%)	78 (100.0%)
Materials	73 (55.7%)	34 (26.0%)	24 (18.3%)	131 (100.0%)
Automation	107 (62.9%)	49 (28.8%)	14 (8.2%)	170 (100.0%)
Info. Science Theory	9 (60.0%)	3 (20.0%)	3 (20.0%)	15 (100.0%)
TOTAL	398 (56.4%)	183 (25.9%)	125 (17.7%)	706 (100.0%)

Excluded from table: 2 references from an article with an "Unclassifiable" subject.

Chi-square = 17.9 with 10 degrees of freedom; $p = .06$

Halperin found, source articles on library automation cited more recent references than did articles on other subjects. (Source articles on library history are not included in this analysis since they were effectively eliminated by the sampling design.)

5.6.6 Journal of Source Article and Research Method of Cited Articles

The core journal of the source article was crossclassified with the research methods of the references it cited to determine whether the distribution of research methods for the cited articles by source journal was similar to the distribution of research methods for the source articles by source journal (Table 5-15). The table is too sparse for a valid chi-square test but some differences are noted.

- 54.8% of the articles referenced by source articles in College and Research Libraries were surveys or experiments.
- 66.7% of the articles referenced by source articles in Government Publications Review were surveys or experiments.
- 57.5% of the articles referenced by source articles in Information Processing and Management were theoretical research.
- Research articles cited by source articles in Journal of Documentation were mainly theoretical (48.8%) and bibliometric (34.2%) research.
- 35.9% of the articles referenced by source articles in Journal of Education for Librarianship were surveys or experiments.
- More than 50% of the articles cited by source articles from ten journals were non-research: American Archivist (88.9% of the references were to non-research), Aslib Proceedings (52.4%), Journal of Education for Librarianship (64.2%), Library Journal (66.7%), Library Resources and Technical Services (62.5%), Library Trends

TABLE 5-15: Referenced Articles Cited by Each Source Journal, by Research Method

Reference Methodology: / Journal:	Theoretical Analytic	Info.System Design	Surveys on Lib.Public	Surveys or Experiments	Biblio-metrics	Not Research	TOTAL
1. Amer. Archivist	1	0	0	0	0	8	9
2. Amer.Libs.	0	0	0	0	0	0	0
3. Aslib Proc.	8	0	6	5	1	22	42
4. BSSL	0	0	5	2	6	9	22
5. Can. LJ	0	0	0	0	0	0	0
6. CRL	6	0	0	17	2	6	31
7. Drexel LQ	0	0	0	0	0	0	0
8. Film LQ	0	0	0	0	0	0	0
9. Govt.Pub.Rev.	2	0	0	10	0	3	15
10. IFLA	0	0	0	0	0	0	0
11. IPM	23	8	0	3	1	5	40
12. Inter.Lib.Rev.	8	0	0	10	0	3	21
13. J of Acad.Lbnshp.	9	0	4	4	4	18	39
14. J of Doc.	20	2	0	3	14	2	41
15. J Educ.Lbnshp.	0	0	0	19	0	34	53
16. J Info.Science	8	9	0	9	12	4	42
17. J Lbnshp.	2	1	0	2	0	2	7
18. J Lib.Auto.	0	0	0	0	0	0	0
19. J Lib.Hist.	0	0	0	0	0	0	0
20. JASIS	38	14	0	18	21	24	115
21. Law LJ	0	0	0	6	0	4	10
22. Lib.Acq.	12	0	2	1	17	14	46
23. Lib.Assoc.Rec.	0	0	0	0	0	0	0
24. Lib.Hist.	0	0	0	0	0	0	0
25. LJ	2	1	0	0	0	6	9
26. LQ	3	0	0	1	0	1	5
27. LRTS	1	4	0	7	0	20	32
28. Lib.Tech.Rep.	0	0	0	0	0	0	0
29. Lib. Trends	1	2	1	2	0	14	20
30. Libri	0	0	0	0	0	4	4
31. Med.Lib.Assoc.	7	0	0	10	10	11	38
32. Online	0	0	0	0	0	0	0
33. Online Rev.	0	0	0	0	0	4	4
34. RQ	0	0	1	0	0	6	7
35. Schol.Pub.	0	0	0	0	0	0	0
36. School LJ	0	0	0	0	0	0	0
37. School Media Q	0	0	0	0	0	0	0
38. Serials Lbn.	0	0	0	1	0	4	5
39. Special Libs.	4	0	3	10	0	6	23
40. UNESCO JIS	0	0	0	0	0	0	0
41. Wilson Lib.Bul.	0	0	0	0	0	0	0
TOTAL	155	41	22	140	88	234	680

Excluded from table: 14 references to three other methodologies and 14 missing references.

(70%), Libri (100%), Online Review (100%), RQ (85.7%), and Serials Librarian (80.0%).

Recognizing that the source articles surveyed from the core library journals represented only one year and that the cited articles represented several different years, it is interesting to compare and contrast the distributions of research methods of source articles and cited articles by source journal to suggest journal characteristics (compare Tables 4-1 and 4-10 with Table 5-15).

5.6.7 Journal of Source Article and Journal of Cited Articles

Another test of the degree to which the subject of librarianship cites itself was performed: a test of self-citation for the core journals. In Table 5-16 the journals which cited themselves are shown.

Almost half (19) of the 41 core journals had source articles which cited the source journal. The degree of self-citation for the different journals varied. Those journals for which self-citations were more than 50% of the journal references made by the journal were: American Archivist, Law Library Journal and Online Review (all specialized journals). It is also interesting to see the proportion of self-citations (to all references), made to the self-citing journals (while recognizing the limits imposed by the study design). For seven of the 41 core journals, self-citations accounted for more than 50% of the references made to them by the core journals in the survey.

TABLE 5-16: Journal Self-citation in the 100 Sample Source Articles from Core Library Journals of 1980

Journals that Cited Themselves:	# of Refs. to Itself	As % of All Journal Refs. from It	As % of All Journal Refs. Made to It
Amer.Archivist	6	66.7%	100.0%
Aslib Proc.	15	33.3	71.4
CRL	9	29.0	18.0
Govt.Pub.Rev.	8	47.1	100.0
IPM	2	4.6	10.0
J Acad.Lbnshp.	4	9.8	30.8
J of Doc.	7	15.6	24.1
J Educ.Lbnshp.	17	31.5	81.0
J Info.Science	1	2.4	33.3
J Lbnshp.	2	28.6	16.7
JASIS	30	25.4	40.0
Law LJ	8	80.0	100.0
Lib.Acq.	2	4.3	66.7
LJ	1	11.1	6.3
LRTS	14	43.8	46.7
Med.Lib.Assoc.	13	32.5	72.2
Online Rev.	4	80.0	57.1
RQ	1	14.3	12.5
Special Libs.	7	30.4%	31.8%

6. SUMMARY AND CONCLUSIONS

In this study of library research the 343 research articles published in 41 core library journals during 1980 were described. It was found that library research literature is continuing to grow but that the proportion of research to non-research in the literature fell between 1975 and 1980. Over 40% of the source articles relied on survey methods: surveys or experiments on libraries or surveys on the library public. The next most frequently used method of the source articles was theoretical/analytic research (21.2%). Bibliometrics were used by 10.9% of the source articles. Compared with other studies a dramatic decrease in the use of historical methods (to 7.3%) was noted.

The source articles were almost evenly distributed among six general subjects of library science. Compared with other studies this subject distribution represents an increase in research on automation and a decrease in historical research.

The average number of references per source article was 12.6 and the median was nine references. The mean number of references per article was highest for historical research (35.6) and lowest for surveys on the library public (8.9), surveys or experiments on libraries (8.7) and bibliometric studies (8.5). Sixteen percent of the source articles had no references; 28.2% had less than four references. Of all references, 44.5% were to journal articles.

From the source articles a random sample, stratified by research method, of 100 articles was drawn and their 708 references to journal

articles examined. It was very interesting to find that 82.5% of the research articles cited by the sample source articles were in the field of library and information science, implying little interaction with other disciplines. Of the articles on library administration, only 74.5% cited library and information science articles whereas 95.0% of the articles on technical processes cited library and information science articles.

Another indication of the closed nature of library research was the extent to which the core journals cited each other. Only 38.3% of the journal references made by the sample source articles were to journals outside the 41 core journals.

A third of the articles cited by the sample source articles were not research. Of the 460 research articles cited by the sample source articles, a third (33.7%) were theoretical/analytic research and a third (35.2%) were surveys or experiments. The distribution of the cited articles by research method was similar to the distribution of the sample source articles by research method.

Over half (56.5%) of the cited articles were five years old or less implying that the journal literature cited by research articles in librarianship is quite recent. The source articles on automation cited more recent articles than did articles on other subjects.

The general picture presented by these data is of a developing research literature relying heavily on its own recent literature.

Relationships between source articles and the articles they cite were also examined in the sample. The cited articles were likely to be the same methodology as the source article which cited them. Surveys on the library public cited more non-research (44.0%) than references

of any research method and bibliometric studies cited the least (19.3%) non-research of all the source articles. There appeared to be no difference in the age of the cited articles depending on the research method of the source article. The subject of the source articles was found to be related to the research methods of the cited articles.

The limitations of the present study must be considered when attempts are made to infer from or generalize its results. In this study research articles from an identified core of library journals published during 1980 were studied. References examined from the sample of research articles were to journal articles only. Subject and research method of references were collected only from those referenced articles which were research. Since Line's studies have shown that differences exist between ranked and random journal articles and their references, between references to journals and to all materials and between references from journals and from all materials, care must be taken when comparing these study results to others.

The description of the research articles and their references was patterned after Peritz's research to provide longitudinal data for comparison. Subsequent similar studies are required for analyzing the trends in library research. In addition, since this study was restricted to the analysis of references to journal articles, more comprehensive analysis of the various forms of materials referenced by library research would complement the results of this study.

Other research suggested by this study concerns the characterization of journals in librarianship. Citation studies and studies of research have been undertaken to describe several individual library journals. The present analysis suggests other variables to be considered in subsequent descriptions of library journals.

This study has presented evidence to support new types of relationships between the source article and its references. The conclusions about these relationships complement studies on the functions of references. Also these results may suggest other indicators of relatedness to consider when describing an article and the articles which cite it. Continuing research is needed to substantiate these findings and to extend their generalizability.

In this study the nature of research in librarianship has been investigated. The scientific character of librarianship will continue to be asserted and questioned and further research in the area will be required.

NOTES

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[30]Peritz, "Research in Library Science," pp. 64-5.

[31]Schlacter and Thomison, p. 376.

[32]Peritz,"Research in Library Science," p. 121.

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[35]LaBorie and Halperin, p. 278.

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